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UNIVERSITY OF TORONTO



REPORT OF THE DEAN OF THE FACULTY OF MEDICINE

Session 1964-1965

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THE DEAN OF THE FACULTY OF MEDICINE

The need for change in medical education has been mentioned and predicted in this Report for many years. Now the possibility of achieving major improvement is a reality and in fact is greater than hoped for even one year ago.

On October 31, 1964, the Premier of Ontario announced the Province's commitment to major support of medical education in all its aspects. For the University of Toronto, this meant that the recommendations of the Special Committee of the Board of Governors on the Future Development of the Faculty of Medicine could be implemented as rapidly as possible. The acquisition of new facilities carried with it, however, the commitment to increase enrolment by 75 students per year, so that the maximum number of students in each medical class would be 250.

This was the subject of a lively debate in the Faculty Council, but the majority of members supported the expansion in spite of the dominant philosophy in Great Britain and the United States of America that medical education reaches its highest development in the intimate atmosphere of the small and self-contained medical centre. The latter, a teaching hospital/basic science integrated, research complex, reached its fullest development in the latter part of the last decade in North America, where it undoubtedly made possible major advances in medical knowledge and education. This, however, has been at a cost. The existing medical schools have failed to provide the physicians and ancillary personnel in numbers required by the expanding population. The problem of numbers has been met in other disciplines and professions in two ways—through expansion of existing schools and the development of new ones, whereas in Medicine two considerations have dominated all thought regarding the optimum size of a medical school. The first of these is that in the clinical sciences the student must have a direct and individual relationship with his teacher just as he must with the patient he is studying. This means that the ratio of clinical teachers to students is very high, in fact, greater than one to one. The second circumstance that has made medical educators resist to the utmost any increase in size of medical schools has been the increasing importance of interdisciplinary research during the past 15 years. The investigator in medical science no longer works in isolation. If he is not part of a team then he must be in constant communication with his colleagues in related fields of investigation. To achieve the optimum relationship between the various disciplines of medical science, it has been felt that the small institution where basic scientists and clinical scientists were in the closest possible communication was the only way to foster medical research.

The University of Toronto, always a large school, has been faced with the problem of its bigness for many years, but the necessity of changing its form of organization has become increasingly apparent during the past 15 years. As reported last year, the Special Committee of the Board of Governors recommended a bipolar development of the Faculty, with creation of several clinical schools, where the academic programme of the last two years of the undergraduate course would be given in parallel. Breaking up a class of 250 students into smaller units and providing continuity of association with one major hospital and its teaching staff would overcome the problem of the large class rotating through many hospitals. The prolonged association of a student with one institution would permit him to develop a greater sense of identification with that institution and a more intimate, because prolonged, relationship with the staff. The optimum atmosphere for good teaching would thereby be established.

In the preclinical sciences, or the basic sciences, the very high ratio of teacher to student is not required to the same extent as in the clinical sciences. The basic medical sciences are all biological sciences, no different from the other divisions of

biology within the University, where large numbers of students are taught and very well taught by breaking the class up into sections, and thereby maintaining a good staff-student ratio and continuity of association between the teacher and the student. Therefore it is my opinion that in the past the medical educators have been in error in trying to treat the whole medical school on the same basis that one must treat the clinical disciplines, in so far as undergraduate education is concerned.

With regard to the second problem, interdisciplinary research, it is much broader than medical science alone. As reported previously, this Faculty of Medicine has already formed liaisons with Applied Science, the Social Sciences and the Humanities for the development of interdisciplinary research. It is very evident now that the future development of biological research will be increasingly dependent upon closer integration, not only of its various subdivisions and branches, but also with the Natural and Applied Sciences. The problem today is the organization and development of basic medical sciences in relation to biology and the natural sciences, and then the extension of the basic medical sciences into clinical medicine.

The creation of a new medical building with space for clinical investigators to work with the basic scientists is only a partial answer to the problem. There must also be basic scientists in the teaching hospitals, not only to provide the continued instruction in basic science to undergraduates throughout the clinical years, but also to co-operate and work with the clinicians in interdisciplinary research. This is one of the major problems we face and its solution is not yet clear.

It is quite evident now, I think, that the University of Toronto will meet the challenge of providing sufficient numbers of physicians for the needs of the population through concentration of preclinical teaching on the campus, and decentralization of clinical teaching into three or four separate clinical schools. The problem of integration of research and its development is greater, more difficult of solution, and ultimately of far more significance to the quality of education in the Faculty.

It is a pleasure to report that immediately following the announcement by the Premier of Ontario of increased support to the University of Toronto, a Users' Committee for a new medical building was appointed and, with the invaluable assistance of Mr. D. M. Turnbull, within six months produced a report of requirements for such a building. Detailed planning is now in progress and it is anticipated that this building will open in 1969. A second Users' Committee in the Banting Institute, appointed to study the requirements for additional space and to re-allocate existing space, has submitted a report that is now before the Board of Governors. It is hoped that this will soon be approved and that construction of a new east wing to provide the much needed additional space will not be long delayed.

Of major importance to the Faculty, particularly in relation to the increased enrolment anticipated in 1969, was the announcement by the Chairman of the Board of Governors and the Premier of Ontario that the University of Toronto would acquire Sunnybrook Hospital as a teaching hospital. At time of writing, negotiations are still proceeding regarding the problems of transfer of the hospital to the jurisdiction of the University of Toronto. Following the announcement by the Premier of increased support to medical education, including the teaching hospitals, the problems of decentralization and its implementation have been intensively studied by the hospitals and the University. It is expected that the full programme of expansion and development of the University of Toronto in Medicine will not be accomplished in less than five years.

The report of the Curriculum Committee was received by the Faculty Council, and since that time has been under study by the individual departments. Considerable progress has been made, of necessity, in the basic science departments, towards development of new curricula, because it was imperative that the new medical building be planned to conform to the function it would fulfil. In the clinical departments discussions are continuing. Here it is anticipated that the full curriculum will take time to work out.

During the past year admissions to the Faculty at all levels have been handled by one Committee. This has been a singularly successful change, but has imposed a very heavy burden on members of this Committee. It has meant a uniform policy with regard to admissions to the premedical course, as well as the medical course. The need for continuing study of admissions policy, based upon research into the results of past and present policies of admission, is increasingly evident. The appointment of Dr. W. B. Spaulding as Associate Dean in charge of Student Affairs has been of immeasurable help in this regard, as well as in dealing with the large numbers of students requiring counselling during their course. In the past year 125 students were admitted to the premedical course and 175 were admitted to the first medical year. Of this latter group 63 were admitted following a degree course in Arts or Science. In the next year it is planned to admit 135 students to the premedical course but the number admitted to the first medical year will have to be reduced by the number of students it is anticipated will enter the second medical year from the course in biological and medical sciences. The total enrolment in 1966 in the second medical year will reach 175 through the addition of the first group of students to take the course in biological and medical sciences established in 1962. Again in 1964 a considerable number of qualified students could not be accepted into the premedical course or into the first medical year because of the limitation of places available. It is almost impossible to determine how many of these qualified applicants who fail to gain admission to the University of Toronto ultimately gain admission to this medical school or another medical school in the Province. A recent study by the Association of Canadian Medical Colleges revealed a large number of duplicate applications on the part of students and the implication was that few of them who were well qualified ultimately failed to gain admission to this or some other medical school.

It is a pleasure to report that the Faculty was again accepted as an approved medical school by the survey team of the Association of American Medical Colleges, the American Medical Association and the Association of Canadian Medical Colleges. The last survey had taken place 10 years ago and in the interval there had been many changes, not only in medical education, but in this medical school. Again the survey team was critical of some aspects of our programme but offered constructive criticisms that will be of major help in the future development of the Faculty. They were, at the time of the survey in September, 1964, critical of the decision to enlarge the medical school but since that time publication of the Coggeshall Report *Planning for Medical Progress through Education* has lent major support to the plan for the programme that will be put into effect at the University of Toronto. This report emphasizes the necessity of schools of medicine developing their university relationships to the full and, too, devising means of expansion to meet the problem of numbers posed by the expanding population. It is my firm opinion that the University of Toronto is pioneering in a new development that may well be and should be a model for the whole of North America. Its ultimate achievement will be difficult but with the spirit of co-operation now prevalent throughout the Faculty will be successful.

Research in the Faculty continues to flourish as shown by the reports of the individual departments and the numbers of publications and addresses given by members of staff throughout North America and abroad. The Faculty has maintained its reputation in the past decade with difficulty, because of the limitation of facilities and budget, but the atmosphere of frustration that had been growing steadily is being dissipated by plans for development that are now quite clearly under way.

Staff

During the past year there have been major changes in staff. Dr. C. H. Best, Professor and head of the Department of Physiology since 1929, and Professor and head of the Banting and Best Department of Medical Research since 1942, has

relinquished his post as head of Physiology to devote his full time to the Banting and Best Department of Medical Research. Dr. R. E. Haist, a member of the Department of Physiology since 1940, has been appointed chairman of the Department of Physiology.

Dr. C. S. Hanes, Professor and head of the Department of Biochemistry, has relinquished his post as head to devote his full time to research. He is succeeded by Dr. G. E. Connell, a member of the Department of Biochemistry since 1957.

In the Department of Anatomy, Dr. J. W. Duckworth has relinquished his post as head to devote his full time to teaching and research. He had held this post for eight years. He is succeeded by Dr. A. W. Ham, Professor of Histology and one time head of the Department of Medical Biophysics.

Dr. D. E. Cannell, Gordon C. Leitch Professor and head of the Department of Obstetrics and Gynaecology since 1950, has retired and has accepted an appointment as Executive Director of the Ontario Cancer Treatment and Research Foundation. He is succeeded as head of the Department by Dr. William Paul, formerly Professor and head of the Department of Obstetrics and Gynaecology at the University of Alberta and before that a member of the staff of the department of which he is now head.

In the Department of Radiology, Dr. M. M. Hall has retired, to be succeeded by Dr. Brian Holmes, a member of the staff of this department since 1950.

It is with deep regret that I report the death of Dr. John McArthur, Associate Professor in the Department of Obstetrics and Gynaecology; of Dr. Mitchell Kohan, recently retired as Chief-of-Service in the Department of Medicine in the New Mount Sinai Hospital; of Dr. Trevor Owen, formerly Associate Professor in the Department of Medicine; of Dr. A. A. Fletcher, formerly Associate Professor in the Department of Medicine; and of Dr. R. F. Farquharson, Emeritus Professor of Medicine and chairman of the Medical Research Council. Dr. Farquharson's death while holding a post of major importance to the development of medical research in this country is a tragic loss.

At the end of this year the following members of staff have retired: Dr. Nelson Henderson and Dr. Leslie Watt of the Department of Obstetrics and Gynaecology; Dr. T. A. Crowther of the Department of Medicine; Dr. H. E. Edwards of the Department of Paediatrics; Dr. W. S. Keith and Dr. S. D. Gordon of the Department of Surgery; and Dr. M. I. Tom of the Department of Pathology. Graduate Lecturers who have retired are: Dr. W. G. Cosbie and Dr. D. M. Low formerly of the Department of Obstetrics and Gynaecology; and Dr. C. W. Harris, Dr. J. L. McDonald and Dr. D. W. G. Murray of the Department of Surgery.

Dr. Shirley Fleming is continuing on leave of absence to hold the post of Professor of Anaesthesiology at the University of Lagos. Dr. T. Frederick Nicholson, who has been Professor of Pathology there for the past two years, is returning to resume his appointment as Professor in the Department of Pathological Chemistry. The Dean of the Medical School of the University of Lagos, Professor H. O. Thomas, has expressed his deep appreciation of the outstanding support and contribution these two members of staff of the University of Toronto have made to the development of the new medical school in Nigeria.

Professor J. M. Fisher of the Department of Biochemistry has been on sabbatical leave during the last half of the year to pursue research at the University of Cambridge. Professor Werner Kalow has similarly been on leave of absence to work in West Germany.

Honours

Dr. H. B. Fairley was elected to the Academy of Anesthesiology. Dr. Iain MacKay was appointed Honorary Physician to Her Majesty Queen Elizabeth, the Queen Mother, during her visit to Canada in June, 1965. He was also appointed Surgeon to the Toronto Corps of St. John's Ambulance Association. Professor H. E. Johns

received the Canadian Association of Physicists Medal for his outstanding contribution to physics in Canada. Professor L. Siminovitch received the Louis Rapkine Memorial Medal of the Institut Pasteur, Paris. He was also appointed to Section III of the Royal Society of Canada. Professor G. F. Whitmore was appointed to the Radiation Study Section of the National Institutes of Health as their expert in Radiobiology. Professor A. F. Howatson was appointed Consultant to the National Cancer Institute, National Institutes of Health, in connection with the Special Virus-Cancer-Leukemia Programme. Professor Philip Greey was made an Honorary Fellow of the Royal College of Physicians and Surgeons of Canada.

Dr. E. Bergsagel was appointed to the Chronic Leukemia and Myeloma Task Force of the United States of America National Cancer Institute, and Secretary of the Haematology Panel, Adverse Reaction Committee, AMA Council on Drugs. Dr. A. W. Chisholm was appointed Chairman of the OMA Section of Cardiology. Dr. J. H. Crookston is Canadian representative on the International Committee for Standardization in Haematology, European Society of Haematology, and Counsellor of the International Society of Blood Transfusion. Dr. S. Dubiski is a member of the New York Academy of Sciences. Dr. J. R. Evans was appointed Dean of the new medical school at McMaster University. He is a member of the American Physiological Society, the Cardiac Muscle Society, Councillor of the Canadian Society for Clinical Investigation, and was Chairman of the 12th annual meeting of Markle Scholars. Dr. J. M. Finlay was made Secretary of the Canadian Association of Gastroenterology. Dr. D. Gordon is a member of the Canadian Rheumatism Association, Dr. H. C. Hair a Fellow of the American Geriatric Society, and Dr. H. P. Higgins a member of the Endocrine Society. Dr. I. M. Hilliard was elected Vice-President of the Academy of Medicine, and was appointed Chairman of the Medical Advisory Board of the Canadian Heart Foundation. Dr. J. B. Houpt was made a member of the American Rheumatism Association, the New York Academy of Sciences and the Council of the Clinical Research Society, Toronto. Dr. O. Kofman was elected Vice-President of the Medical Alumni Association. Dr. J. C. Laidlaw served as Chairman of the Part III Committee, National Board of Medical Examiners, United States of America, the Awards Committee of the Endocrine Society, United States of America, and the WHO Scientific Group on Neuroendocrinology and Reproduction in the Human. Dr. R. S. McPhedran was elected to the Canadian Neurological Society. Dr. J. W. Meakin was made Chairman of the Section of Cancer, Academy of Medicine. Dr. D. P. Murnaghan was elected to Fellowship in the American College of Cardiology. Dr. J. F. Mustard was elected President of the Canadian Society for Clinical Investigation, and Secretary of the American Society of Haematology.

Dr. R. Pos received the Annual Research Award of the Canadian Mental Health Association. He was a member of the Board of Toronto Psychoanalytic Forum of the Humanities, and Secretary, Users' Committee, Research Division, Clarke Institute Symposium, New York Academy of Medicine. Dr. E. Prokipchuk was made an Associate member, Canadian Association of Gastroenterology, a member of the Clinical Research Society of Toronto, and Secretary of the Toronto GUT Club. Dr. J. C. Richardson was appointed head of the new Neurological Unit, Workmen's Compensation Board Hospital, and chairman of the Specialty Committee in Neurology, Royal College of Physicians & Surgeons of Canada. Dr. D. Schatz is Secretary, Medical Section, Academy of Medicine. Dr. J. L. Silversides was appointed Physician-in-Chief of the Alcohol and Drug Addiction Research Foundation of Ontario, and Neurological Consultant to the Workmen's Compensation Board. He is chairman of the Medical Advisory Board, Multiple Sclerosis Society of Canada. Dr. H. A. Smythe was made chairman of the Third Canadian Conference on Research in the Rheumatic Diseases. Dr. W. B. Spaulding was appointed Associate Dean, Student Affairs, and was elected President of the Toronto Medical Historical Club. Dr. K. J. R. Wightman was appointed to the Expert Group on Adverse

Reactions to Drugs of the WHO, Geneva. He is President-Elect, Canadian Association of Gastroenterology. Dr. C. R. Woolf is a member of the Committee on Inhalation Therapy, American Clinical and Climatological Association. Dr. E. R. Yendt is a member of the American Clinical and Climatological Association. Dr. R. F. Farquharson, late Professor Emeritus, was chairman of the Canadian Foundation for the Advancement of Therapeutics, Honorary Fellow of the Academy of Medicine and of the Royal Society of Medicine, Honorary Member of the Ontario Medical Association. He received the doctorate *honoris causa* of the University of Montreal, and the Medal of Honour of the Canadian Pharmaceutical Manufacturers Association.

Dr. W. S. Goodman was Chairman of the Section of Otolaryngology, Academy of Medicine. Dr. D. Snell was elected to Fellowship in the American Triological Society. Professor P. E. Ireland was appointed an official representative from Canada to the International Congress in Tokyo. He was invited by the Government of India and the Minister of Health to address ten medical schools in India, and present a paper at the All India Academy of Medical Sciences. Dr. J. S. Crawford is chairman of the Visual Panel of the Defence Research Board. Dr. D'Arcy Macdonald is on the Advisory Board of the Contact Lens Association of Ophthalmology, and is chairman of the Contact Lens Committee of the Canadian Ophthalmological Society. Dr. J. S. Speakman was appointed to the Advisory Committee on Ophthalmic Research of the Department of National Health and Welfare. Dr. R. K. MacDonald is chairman of the Section of Ophthalmology of the Academy of Medicine. Dr. J. C. Hill was chairman of a symposium on Recent Advances of the Lids at the VII Pan American Congress of Ophthalmology. Dr. P. K. Basu was awarded a Medical Research Associateship by the Medical Research Council of Canada. Dr. Clement McCulloch was appointed assistant editor of the *Transactions* of the American Ophthalmological Society. Dr. W. S. Hunter was appointed Canadian representative of the Eye Pathology Alumni of the Armed Forces Institute of Pathology, Washington.

Professor A. M. Rappaport received the Honours Achievement Award of the Angiology Research Foundation. Dr. T. C. Brown was elected President of the Academy of Medicine. Dr. J. Steiner received the Shovel Award, and was elected member of the Editorial Board of the *American Journal of Pathology*. Dr. M. J. Phillips was chairman of the Section of Pathology, Academy of Medicine. Dr. Wm. Anderson was elected chairman of the Section of Pathology of the OMA, and Professor A. C. Ritchie is a member of the executive. Professor J. A. Dauphinee was elected President of the Royal Canadian Institute. Dr. C. J. Porter was elected President of the Canadian Society of Clinical Chemistry. Dr. W. E. C. Allt was made an Honorary Fellow of the Faculty of Radiologists of Ireland. Dr. C. L. Ash was made a Fellow of the Royal College of Physicians and Surgeons of Canada. Dr. F. A. Beale became a Fellow of the Faculty of Radiology of London, England. Professor M. M. R. Hall became Professor Emeritus of Radiology. Professor E. A. Sellers was elected President of the Pharmacological Society of Canada.

Dr. John S. Crawford has been appointed chairman of the Medical Advisory Board of the Toronto Rehabilitation Centre. Dr. C. M. Godfrey has been appointed chairman and Curator of the Museum of Medical History of the Academy of Medicine. Dr. W. O. Geisler was appointed Deputy Secretary General of the Fifth International Congress of Physical Medicine. Professor D. E. Cannell became Professor Emeritus of Obstetrics and Gynaecology. Dr. P. F. Beirne, Dr. J. L. Harkins, Dr. W. H. Murby and Dr. R. H. Wesley were elected to Fellowship in the American College of Obstetricians and Gynecologists. Dr. A. M. Hood was elected President, Ontario Psychiatric Association. Dr. C. A. Roberts was elected President, Canadian Psychiatric Association. Professor A. B. Stokes delivered a Maudsley Bequest Lecture in London, England.

Dr. J. A. MacFarlane, Dean Emeritus, received the degree of Doctor of Laws, *honoris causa*, from the University of Alberta. Professor F. G. Kergin was the F. R. Eccles Lecturer at the University of Western Ontario. Professor F. P. Dewar was

guest lecturer at the Postgraduate Medical Assembly of South Texas and was elected to an Honorary Fellowship in the Houston Orthopaedic Club. Professor W. G. Bigelow was guest lecturer at the Silver Jubilee of the Association of Surgeons of India, and was made an Honorary Member of that Association. He gave the Hunterian Lecture to the Hunterian Society of London, England, and was guest lecturer at the University of Leiden, Holland. Professor W. K. Lindsay was made a member of the Board of Trustees of the American Association of Plastic Surgeons, and Chairman of the Programme Committee of that Association. Professor T. P. Morley was Visiting Lecturer at the University of Saskatchewan. Professor R. B. Salter was Visiting Professor at the University of Michigan, the University of Grenoble and the University of Utrecht. He gave the Murray Gardner Memorial Lecture at Watertown, N.Y., and was guest lecturer at Oxford, Cambridge, the University of Paris, the University of Toulouse, and the University of Copenhagen, as well as the Nebraska Medical Society and the Southern Medical Association. Dr. E. H. Simmons was one of two Canadian orthopaedic surgeons chosen as an American-British-Canadian Travelling Fellow for a group visit to British orthopaedic centres.

Visitors

Many outstanding members of the medical profession visited the Faculty during the year, including the following:

Department of Anaesthesia: Professor Leroy Vandam of Harvard University, who gave the sixth Dr. Harry Shields Lecture in November.

Department of Art As Applied to Medicine: Miss Mary Lorenc, Medical Illustrator and Instructor of Anatomy at New York Medical College, who conducted a symposium.

Department of Medicine: Dr. G. E. Bauer of Australia; Professor Russell Fraser, Dr. J. E. French, Dr. M. Hartog, Dr. A. Kelus, Dr. H. McIlwain, Dr. Celia Oakley, Dr. J. O. Brien, Dr. R. R. Race, Dr. R. Sanger, and Dr. M. J. C. Tsapagos of England; Dr. H. C. Kallfetz of Germany; Dr. J. A. Marsden of New Zealand; and Dr. E. Sandoe of Denmark.

Department of Obstetrics and Gynaecology: Sir John Peel, Mr. John S. Blaikley, Professor J. McLure Brown of London, England; and Dr. Sinichi Yagi of Japan.

Department of Ophthalmology: Professor Sidney Lerman of Rochester and Mr. J. S. Crews of Birmingham, England; Dr. Robert Schaeffer of the University of California Medical School, who gave the Walter W. Wright Lecture.

Department of Otolaryngology: a number of prominent Otolaryngologists throughout the world who attended a Conference on the Treatment of the Hard of Hearing Infant and Child, sponsored by Mr. and Mrs. E. C. Fox, at which this Department acted as host.

Department of Paediatrics: Professor John Beveridge of the University of South Australia, Mr. R. E. Bonham-Carter, Mr. Geoffrey W. Dawes, Mr. G. Jackson Rees, Mr. David J. Waterson of England; Dr. Robert Schwab of Harvard Medical School, U.S.A.

Department of Pathology: Professor C. V. Harrison, Dr. D. Doniach, and Dr. I. M. Roitt of England; Dr. W. Bernard, Dr. J. André, Prof. R. Kourilsky of France; and Professor D. F. Coppel, Scotland.

Department of Physiology: more than 2,000 registered visitors representing 45 different countries, who attended the Fifth Congress of the International Diabetes Federation in July, 1964, at which this Department was host.

Department of Psychiatry: Dr. Lawrence Hinkle of Cornell University and Dr. Heinz Lehmann of McGill University, who delivered lectures.

Department of Surgery: Dr. Bertram Selverstone of Tufts University, Boston, Massachusetts, who gave the annual Balfour Lecture; and Mr. H. Osmond-Clarke of London, England.

JOHN HAMILTON

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor R. Ian Macdonald

During the 1964–1965 session 1,661 students were registered with the Division. Of these, 1,167 were doctors in active practice who attended one or more of the twenty-five refresher courses organized to meet the special needs of different groups. In addition, the advanced graduate courses in Medicine, Surgery, and Obstetrics and Gynaecology were given over a six-week period in the late summer. They were attended by 74 students from different parts of Canada with a few from abroad. As in previous years the amount of faculty teaching time devoted to the advanced graduate courses and to the short refresher courses in different subjects in medicine was very substantial. Each department bearing the main responsibility for a course kept in mind the needs of colleagues in active practice. The greater number of the courses were of particular interest to doctors in general practice in Ontario. Others were directed to different specialist groups in the province and some, such as the Eye Surgery Clinical Meeting, the Ninth Annual Course in Radioactive Isotopes, the Otolaryngology Clinical Meeting, and the course in Medical Genetics, attracted doctors from all across the country. The Eighth Annual Refresher Course in Public Health offered by the School of Hygiene proved to be of wide interest and attracted students from a wide area.

Four hundred and seven of those registered were graduate students working and studying full time in clinical and basic science departments. Thirteen were enrolled in part-time (summer courses) proceeding to the B.Sc.(Med.) degree. Eighty-four of the graduate students were registered in diploma courses, 6 in the B.Sc.(Med.) course, 267 as internes, residents, and fellows and 42 in sessional courses.

The decentralized clinic programme, now in its fourteenth year, sent seventeen teams of university teachers to seven centres in Ontario. This is believed to be one of the most useful postgraduate teaching activities of the Faculty for it provides opportunities for doctors to take part in continuing education in their home area and at the same time brings university teachers into contact with medical problems in different areas.

During the year the Director of the Division served as a member of the Education Committee of the Ontario Medical Association and as university representative on the Council of the College of Physicians and Surgeons of Ontario.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Professor A. T. Jousse

The following received instruction from the division during 1964–65:

GRADUATES:

Physiatrists in training	6
Speech Pathology and Audiology	19
Postgraduate course in Physical Therapy	4

UNDERGRADUATE:

Medicine	
Third year	157
Fourth year	126
Physical and Occupational Therapy	285

The physicians who are training for the special field of Physical Medicine and Rehabilitation were attached to the Toronto Western Hospital, Lyndhurst Lodge Hospital, and Sunnybrook Hospital. One completed his training and passed the certification examinations of the Royal College.

The course in Speech Pathology and Audiology graduated 11 persons in May of this year, all of whom will fill essential roles in treatment situations.

Two teachers qualified after completion of the course of postgraduate training in Physical Therapy.

Teaching of undergraduates was directed at the third- and fourth-year students of medicine by lecture-demonstration and clinic. The staff of the Department of Rehabilitation Medicine of the Toronto Western Hospital assumed responsibility for the instruction of 36 second-year medical students in locomotor disorders. This is part of the new programme whereby certain undergraduates receive their instruction in medicine from one hospital.

Utilization of the Physical Medicine and Outpatient Orthotic Clinic at the Toronto Western Hospital has permitted improved training of Occupational and Physical Therapy students.

Through the Division of Postgraduate Medical Education, practising physical therapists were given a three-day course in the treatment of cardiovascular disorders. The summer clinic for children with speech disorders was sponsored by the Atkinson Foundation. Postgraduate training in speech and its disorders was planned to make use of the clinical cases brought in for treatment, and speech correctionists and dentists were enrolled for short courses of instruction. Forty-five children with speech defects were evaluated and treated, the majority of whom came from areas where such treatment is not available.

Doctors Geisler, Godfrey, and Jousse attended the Fourth International Congress of Physical Medicine in Paris, France in September, 1964. Each contributed to the programme by the presentation of papers or film.

Dr. Godfrey was guest lecturer at the Division of Rehabilitation, University of Ankara, Turkey. He presented lectures on the rehabilitation of patients with cancer and on prosthetic developments.

In March of 1965, Dr. Godfrey visited the Peoples' Republic of China. He was invited by the Chinese Medical Association to lecture, and spoke on general rehabilitation, rehabilitation of damaged hands, on modern methods of fitting prostheses, and on physical therapeutic measures in the treatment of rheumatic disease. During the visit he observed Chinese medical practice.

In April he attended the Pan Pacific Rehabilitation Conference in Tokyo and contributed to the programme by acting as chairman of a panel on speech disorders.

Dr. Crawford delivered a paper at the Canadian Medical Association Convention in Vancouver, on the rehabilitation of the hemiplegic patient. He continued his activity on behalf of the Canadian Arthritis and Rheumatism Society.

RESEARCH

Study of the common infecting organism in the urinary tract of paraplegic patients is being carried out at Lyndhurst Lodge by Dr. Magda Vranic. The influence of various bacteriocidal and bacteriostatic factors is being studied, as well as changes in the organism in relation to urinary Ph.

The Orthotic Department of this division, located at the Wellesley Hospital, has completed the development and evaluation of the lower extremity brace for use by patients with fractured femoral necks in order that they may be mobilized early. The plan for manufacture of this brace commercially has been turned over to the appropriate commercial brace makers.

A new project consists of the development of a light-weight functional type peg-leg prosthesis, using an ischial weight-bearing socket.

An effort is being made to develop a suitable last and design for a shoe for the female with arthritis.

An evaluation of the benefits of proprioceptive neuromuscular facilitation in comparison with standard muscle development exercises is being carried out at the Wellesley Hospital Rheumatic Diseases Unit located in Sunnybrook Hospital.

In the Toronto Western Hospital, Dr. R. E. Renaud is continuing his follow-up studies with the amputee and is working in association with the Department of Urology in an attempt to measure the strength of muscle contractions of the external urethral sphincter as part of the development of a means for appraisal and possible treatment of urinary incontinence.

PUBLICATIONS

- GODFREY, C. M. "Rehabilitation" (*Proceedings of the Tenth Annual Clinical Conference of the Ontario Cancer Treatment and Research Foundation*, Toronto, November 8 and 9, 1963).
- *A Handbook for Laryngectomy*. Toronto: Princess Margaret Hospital. 1964. 33 pp. mimeo.
- "A Department of Rehabilitation" (*Journal of the Toronto East Medical Association*).
- "How to Recognize Children with Speech Disabilities" (*Consultant*, vol. 3, no. 9, Feb., 1965, pp. 36-40).
- GODFREY, C. M. and JOUSSE, A. T. "The Rehabilitation of Patients with Cancer" (film, colour, 16 mm., with sound, 22 minutes). Rehabilitation Series No. 3.
- GODFREY, C. M., CURRIE, G. and JOUSSE, A. T. "The Rehabilitation Therapist" (film, colour, 16 mm., 24 minutes). Rehabilitation Series No. 4.
- JOUSSE, A. T., MACDONALD, MARGARET and WYNN-JONES, MEGAN. "Bladder Control in the Female Paraplegic Patient" (*Paraplegia*, vol. 2, no. 3, Oct., 1964, pp. 146-52).

MEDICAL SOCIETY

(September 1964 to June 1965)

<i>Honorary President</i>	. . . . .	Dean John D. Hamilton
<i>Honorary Secretary-Treasurer</i>	. . . . .	Dr. J. R. Evans
<i>Chairman</i>	. . . . .	Dr. R. Lee
<i>President</i>	. . . . .	H. Hugenholtz
<i>Vice-President</i>	. . . . .	B. Pearson
<i>Treasurer</i>	. . . . .	D. Palframan
<i>Secretary</i>	. . . . .	Miss J. Barrett

The 1964-65 session was a highly successful one for the Medical Society. Though challenging problems presented themselves continually, the achievements were multiple and noteworthy. Some of the year's highlights included the strengthening of the faculty spirit, greater recognition of the Medical Society and its activities within the faculty, the success of the Medical At Home, and the Staff-Student smoker.

The Medical Society Assembly, consisting of twenty-eight members, held bi-weekly meetings under the leadership of Dr. Bob Lee, whose experience as a previous president was invaluable.

One of the major problems confronting the Assembly this year was the substantial debt incurred by the *Medical Journal*, the At Home, and the Athletic Association during the previous year. Careful budgeting, close supervision of the expenses, and appropriation of Duncan Room funds put the Society's finances on a firm basis again so that by the end of the year the balance was once again in black figures.

A concerted effort was made by the Assembly this year to broaden the scope of its activities and services so as to offer opportunities to all the students of all backgrounds and interests, especially the Premedical students. Students were kept closely informed of all the Assembly's decisions through the reinstatement of the *Auricle*, a news bulletin published at the end of every meeting and distributed to the students the following morning. The *Probe*, keeping its newspaper format, ensured the students of good coverage of current events in the faculty and in the university as a whole, and presented opportunities to the students for critical analysis of these events and decisions.

Another problem facing the Assembly this year concerned C.A.M.S.I. After a successful conference in Saskatoon, the C.A.M.S.I. constitution was completely

reorganized so as to give more power to the local organizations and ensure an effective interchange with other schools both regionally, nationally, and internationally. Toronto's persistence in backing this reorganization, her continuous close contact with the other schools and the national executive, and her hosting of the first regional C.A.M.S.I. conference of the four schools in Ontario enabled her to benefit greatly from a valuable interchange of ideas, many of which were subsequently incorporated into our programme. One noteworthy service included as a result of this interchange was the sponsoring of a St. John's Ambulance course for the students during the spring months, so that they might benefit from this first aid training during their summer vacation. The course was well received and attended by some 80 students.

Several constitutional amendments were passed this year, as a result of administrative difficulties encountered, the revision of the C.A.M.S.I. constitution, the revision of the S.A.C. constitution, and the broadening of the scope of the Society's activities. The amendments concerned primarily the redefinition of functions, purposes, and duties.

In spite of the financial difficulties which the *Journal* encountered at the beginning of the year, Jerome Burke, Barry Koehler, and their editorial assistants produced a stimulating *Medical Journal* of a very high quality. Their concentration on the careful selection of material and the semi-professional nature of the *Journal* made it a great credit to this fine staff.

Kirk Achiume, from Zambia and recently arrived in Canada, is to be congratulated on the very fine *Probe* that he and his staff published this year. The *Probe* was well edited, provided good coverage, and good opportunity for critiques from the student body.

Daffydil, again of a semi-professional and musical nature, was successful, well attended, and appreciated. Of note is the fact that this is one of the first years that Daffydil has shown a profit for the Medical Society. Mike Troster and his fine staff are to be congratulated for their efforts and conscientiousness.

The Arts and Letters Society was somewhat hampered at first by the late appointment of its chairman, Anthony MacFarlane, but sponsored an appreciated programme of concerts, art exhibits, debates, Osler Society activities, and the annual Art and Photography contest.

A special word is in order about the Staff-Student committee: this fine committee, under the leadership of Lorne Taichman, excelled this year. Apart from their valuable curriculum studies and special recommendations to the Dean's special committee, the highlight this year was the unequalled Staff-Student Smoker held in the Park Plaza, featuring Mr. T. Douglas M.P., leader of the New Democratic Party, as a guest speaker on Medicare. Over 300 were in attendance at this very stimulating and informative event.

The social functions of the year were most successful. David Posen, our Public Relations Director, planned an excellent Freshman orientation program with a highly successful banquet at Hart House, tours of buildings of interest, and a dance in the Drill Hall.

Bruce Pearson, our Vice-President and chairman of the Social Committee, contributed to the important integration of Medical students with the rest of the University community by sponsoring a successful Fall Discothèque, the "Fallopian Frolic," which was open to the entire University and was well attended. The highlight of the social functions, however, was the most successful of all Medical At Homes, held at last on a Friday night and in the more atmospheric Casa Loma. Attendance was bigger than ever, enabling the dance finally to show a substantial profit instead of the customary loss. Many thanks are indeed due to Bruce and his very industrious committee for organizing this great event.

Another highlight this year was the winning of the Float Parade contest on the Home-coming weekend, thanks to Phil Halloran and his fine first Medical year.

Our S.A.C. representatives were outstanding and brought much credit to the Faculty through their fine leadership and industry. Both Miss Mary Robertson and Michael Schwartz held important administrative positions on the S.A.C. council and contributed substantially to raising the image of Medical students in the eyes of the rest of the University.

Other noteworthy events this year included the survey sponsored by the Executive on the use of various stimulants by students in our Faculty during the year and at exam time. Results were tabulated and a report with recommendations was published for the students to make them further aware of the existing problem. Furthermore, the Summer Employment Index File was notably expanded with over 300 new job opportunities listed for students in our Faculty.

The Medical Alumni Association, as in the past, played an important role in the lives of our students by generous provision of scholarships, bursaries, and loans to the students. Furthermore, the General Practice Panel and Graduation Banquet were well attended and highly appreciated by the student body.

Not to be omitted are the activities of W.U.S., and the successful Red Cross Blood drives organized by Elizabeth Ross.

In true fashion, the year came to a successful close for the Assembly with a successful banquet at the Tiroler House, enabling the appetite to be fed, the spirits to rise, and the frustrations to be washed away.

At the graduation Banquet in March, five Medical Society Honour Awards were presented to graduating students for their contributions to the Faculty in academic, athletic, and extra-curricular fields. This year's recipients were Michael Easterbrook, John Graham, Herman Hugenholtz, Robert McGee, and Robert Orange.

In closing this report, I should like to thank Dean Hamilton for his tremendous interest and support throughout the entire year, and for the enjoyable Hart House Banquet held during the winter months.

My sincere thanks go to all the members of the Medical Society Assembly and all the students in the faculty for the enthusiastic support given to me during the year. Special mention should be made of Bruce Pearson, David Palframan, Joyce Barrett, David Posen, and, of course, our chairman, Dr. Bob Lee. While it is not possible to name all the students who have contributed to life in our faculty, these people deserve special mention for their untiring energy and efforts. It has been a great pleasure and honour for me to serve as their president, and I am confident that they will lend their support to the new president, Peter Culbert, to whom I extend best wishes.

HERMAN HUGENHOLTZ

MEDICAL ATHLETIC ASSOCIATION

(September 1964 to June 1965)

<i>Honorary President</i>	. . . . .	Dr. C. Gray
<i>Honorary Secretary-Treasurer</i>	. . . . .	Dr. Charles F. Snelling
<i>President</i>	. . . . .	R. J. McGee
<i>Vice-President</i>	. . . . .	I. Sinclair
<i>Secretary-Treasurer</i>	. . . . .	J. Hurwitz
<i>Publicity Director</i>	. . . . .	G. C. Magee
<i>Quartermaster</i>	. . . . .	D. Ellis

YEAR REPRESENTATIVES

<i>IV Medical Year</i>	. . . . .	V. Crawford
<i>III Medical Year</i>	. . . . .	R. Link
<i>II Medical Year</i>	. . . . .	S. Ritchie
<i>I Medical Year</i>	. . . . .	D. Mather
<i>II Premedical Year</i>	. . . . .	C. Frewin
<i>I Premedical Year</i>	. . . . .	L. Mandell

The Medical Athletic Association suffered a mild setback from last year's second place finish in the Reed Trophy race, but still was able to win two championships. No particular area showed weakness but there seemed to be a failure to formulate a winning combination in most sports.

The athletic programme began with football. This team experienced some misfortune, losing several of its games by only a few points. The three rugger teams were also unsuccessful in reaching playoff positions. Arrangements for volleyball, formerly one of our strong points, underwent revision this year so that we were limited to a single team. This team, however, after a shaky start, did manage to attain the playoff position before being eliminated. The "first" teams in both hockey and basketball, because of their desire for better competition, moved into the top league in their respective sports. Consequently neither team won as many games as in previous years although the basketball team did manage to reach the playoffs. One of the Faculty's two championships came in squash with the second premedical year B winning the intermediate championship. The other championship was rightfully earned by the second Medical year waterpolo team which defeated P.H.E. in the final game.

The annual golf tournament was the most successful ever. One hundred and nine golfers played at Forest Hill Golf Club, the best players being Tim Richardson and Bill Laird, each with 76.

The second annual ski day was first postponed and finally cancelled because of poor weather conditions.

The Awards Banquet was held March 10, 1965, with Drs. Cameron Gray and Charles Snelling being the main speakers. Dr. Gray presented a light-hearted, amusing speech, while Dr. Snelling told of his experience as a general practioner and international skater. The Athletic Stick, symbolic of highest athletic contribution and participation, was awarded to V. A. Crawford of the final year. The Tom Boeschenstein Award for participation and leadership in the Premedical years, was not awarded this year. Executive keys were presented to I. Sinclair, V. Crawford, and G. Magee while special awards were presented to M. Goldberg, T. Munroe, R. Chintu, S. Gold, P. Manley, R. Peroff, and S. Ritchie. In addition, 31 athletes received First Colour Awards.

This year the reorganization of the purchase and care of athletic equipment continued so that more teams could have better equipment and hopefully perform better. We would like to maintain some continuity in the position of quartermasters so that no one enters the position without some guidance.

I would like to thank all the team coaches, managers, and players who were active in Medical Athletics this past year, for their help in organization and participation and I wish Ian Sinclair and his executive the greatest success in the activities of the coming year.

R. J. McGEE

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September 1964 to June 1965)

<i>Honorary President</i>	. . . . .	Dr. Ricky Schachter
<i>President</i>	. . . . .	Ann Haag
<i>Vice-President</i>	. . . . .	Maridene Mildon
<i>Treasurer</i>	. . . . .	Joan Dixon
<i>Secretary</i>	. . . . .	Trudy Wilson
<i>Social Convenor</i>	. . . . .	Cathy Chambers
<i>I Premedical Representative</i>	. . . . .	Shirley Hunter
<i>S.A.C. Representative</i>	. . . . .	Mary Robertson

Again, this year, the M.W.U.A. had a very busy social year. The annual Initiation Tea, in honour of the new girls registering in the Faculty, was held the first week-end of the Fall Term at the home of the President. As always, this provides

an opportunity for new members to meet the final-year girls and the Honorary President and to become acquainted with the activities of the Association and the Medical Society.

The Initiation Banquet was held at Peppio's Restaurant in October. Despite a conflict with another activity of the Medical Society, there was a gratifying attendance, especially among the women practitioners in the city. Dr. Mary Thornhill presented us with a travelogue of her recent tour through Russia. In order to draw on a larger number of the graduate doctors, and to help finance this annual Banquet, it was decided that next year we would sponsor this occasion jointly with the Federation of Medical Women of Canada. I hope that this venture will be successful for both groups involved.

The mid-November meeting was a supper party with an evening of Philippine dancing given for us by the Federation of Medical Women. There was an excellent turn-out and everyone enjoyed a pleasant time and a delicious supper. A highlight of the event was a tour of Women's College Hospital.

At the annual Christmas Party, held just prior to the Christmas holidays, second Premedical year girls provided the buffet supper and third Medical year girls entertained us. Gifts for the University Settlement were collected, as in previous years.

Early in the third term, there were a number of events for our members. The Medical Alumni sponsored a supper party, with an informal talk and question period, led by Dr. Bette Stephenson. Dr. Stephenson's talk concerned the place in the future of general practice for women doctors. This was very well received by those present, stimulating many questions. It was felt that this was one of the most successful events this year.

Shortly after this, a delightful supper and Theatre Party was given for the girls in the graduating class by the women doctors. This was well attended both by the doctors and by the graduating class and a great many new friends were made that evening.

The final social event was a dessert and coffee party for the graduating class, given by the girls of the third Medical year. At this time, the traditional silver teaspoons were presented to the graduates.

The Common Room received the final benefits from the \$500 grant received from the Medical Society in 1964, with the purchase of a sofa and some additional chairs. As well, the Executive presented a brief to the Planning Committee for the proposed new Medical Sciences Building, requesting the continuation of the policy of provision of a room for the use of the women students in the Faculty. With the enlarging enrolment at present, the facilities are severely crowded, especially at the lunch hour.

Our thanks are due to Dr. Ricky Schachter, our Honorary President, for her enthusiastic interest in our activities and ourselves. Her guidance was greatly appreciated. I wish to extend my very sincere thanks to the members of my executive for their co-operation and support this year, and I wish to my successor, Helen Nicowski, and her executive a very successful and interesting year.

ANN HAAG

MEDICAL WOMEN'S ATHLETIC ASSOCIATION

(September 1964 to June 1965)

<i>President</i>	. . . . .	Patti Gair
<i>Vice-President</i>	. . . . .	Gail Ponting
<i>Treasurer</i>	. . . . .	Pat Blachford
<i>Secretary</i>	. . . . .	Karen Cronin

In September, 1964, brochures describing the activities and awards available through the M.W.A.A. and the University of Toronto Women's Athletic Association were sent out to all the women in the faculty. They were asked to fill in a form indicating the activities in which they intended to participate and return it to the M.W.A.A. A very small percentage replied; however, these girls formed the nucleus of most of the teams representing Medicine in interfaculty competition.

Both the basketball and hockey teams reached the semi-finals and the swimming team managed to win their relay in the annual meet.

Other sports in which medical women participated were volleyball, badminton, and tennis.

New sweaters and equipment were purchased for the hockey team.

The Annual Banquet was held on March 9 at the Nanking restaurant. The guest speaker was Dr. N. T. McPhedran, who showed some very interesting slides and spoke about the Maple Leaf Hockey Team.

Awards made at the banquet were four premedical crests, one medical "M", and the following University awards: one Citation and one Junior "T."

PATTI GAIR

SCIENCE AND MEDICINE DEPARTMENT
UNIVERSITY LIBRARY

Reported by Mrs. Mary H. Galt

The Science and Medicine Department of the University Library continues its rapid growth. An enlarged staff makes it possible to give additional library service and to prepare for the day when part of the University's collection moves to the new Humanities and Social Sciences Research Library. Members of the Library Committee of the Medical Faculty and of the teaching staff have given valuable assistance in the choice of new books and journals. A total of 141 medical serial titles have been added this year to the subscription list, as part of a plan to improve the coverage. Extensive staff donations of journals are to be offered to new medical schools; it is very gratifying to know that in some measure we can contribute towards a nucleus of new medical libraries.

REPORT ON REGISTRATION, SESSION 1965-1966

First Premedical Year	136
Second Premedical Year	115
First Medical Year	162
Second Medical Year	181
Third Medical Year	135
Fourth Medical Year	157
Art as Applied to Medicine	5
Bachelor of Science (Medicine)	2
Bachelor of Science (Medicine) Summer Session	17
(also registered in medical undergraduate years)	
Diploma in Medical Radiology	22
Diploma in Psychiatry	36
Diploma in Industrial Health	4
Diploma in Anaesthesia	22
Graduate Students	272
Physical and Occupational Therapy	274
Speech Pathology and Audiology	13
Student Teachers	5
	<hr/>
	1,558

FELLOWSHIPS, SCHOLARSHIPS, MEDALS, AND PRIZES

Awarded at Convocation, June, 1965

GRADUATE

The Emma Bissell and the Medical Alumni Association Scholarship	C. J. Parsons, M.D.
Graham Campbell Prize	W. S. Goodman, M.D., F.R.C.S.(C).
Canadian National Institute for the Blind Fellowships	W. A. Allin, M.D. B. Craig, M.D.
W. P. Caven Memorial Fellowships	C. Chou, M.D. C. L. Kemp, B.A., M.Sc., Ph.D.
William Goldie Prize	J. A. Little, M.D., M.A., F.R.C.P.(C).
Stuart Alan Hoffman Memorial Prize	C. Chou, M.D.
Arch. Hutchison Fellowship	H. Quesada, M.D.
Frances Esther Hutchison Fellowship	S. S. Sanbar, M.D.
Minister of Health Gold Medal	C. G. Chamberlain, M.D.
James H. Richardson Research Fellowship	A. G. Erwin, M.D.
Sterr Medals	J. G. Ashby, M.D. A. DeW. Baines, M.D., Ph.D. P. E. Conen, M.B., B.S., M.R.C.P.
Edward Christie Stevens Fellowship	I. D. MacKay, M.D.
John Alexander Stewart Fellowships	J. Silversides, M.D., F.R.C.P.(C) H. Quesada, M.D.
Helen L. Vanderveer Fellowship	P. G. Iral, M.D.

UNDERGRADUATE
Fourth Medical Year

Cody Gold Medal	R. P. Orange
Cody Silver Medal	F. Simon
Cody Silver Medal	J. E. J. Schuman
Dr. Benjamin W. Appleton Prize in Psychiatry	Miss L. M. Rapson
Butterworth Prize	E. M. Sellers
J. P. Boley Prize in Ophthalmology	R. P. Orange
Irving Heward Cameron Undergraduate Scholarship	S. P. Smith
Chappell Prize in Clinical Surgery	H. Hugenholtz
Dr. Jacob Goldstein Scholarship	B. J. Rasminsky
Hendry Memorial Scholarship	R. P. Orange
Issei Scholarship in Medicine and Surgery	R. M. Zahoruk
Dr. Louis Kagan Memorial Award	R. P. Orange
Dr. Thomas Arnold McCormick Scholarship	K. H. Shumak
Medal of the Consul General of France	B. J. Rasminsky
Medical Alumni Association Scholarship	H. Hugenholtz
Ellen Mickle Fellowship	J. E. J. Schuman
Ontario Medical Association Prize in Preventive Medicine	F. Simon
Dr. and Mrs. M. A. Pollock Award	D. V. Hoffman
Dr. Roy Simpson Scholarship in Paediatrics	F. Simon
Starkman Memorial Scholarship in Medicine	J. E. J. Schuman

Third Medical Year

Franckel Memorial Award	Miss S. M. Perz
Charles E. Frosst Scholarship	M. A. Baker
J F. Hartz Company Prize in Ophthalmology	N. G. Kee
J. F. Hartz Company Prize in Oto-Laryngology	Miss D. J. Grant
Frank W. Horner Gold Medal	J. S. A. Falletta
Samuel and Minnie Rotman Scholarship	Miss B. Rozkalns
Saddington Medal in Pathology	Miss J. J. E. Turley
Starkman Memorial Prize in Pharmacology and Therapeutics	Miss J. J. E. Turley
Starkman Memorial Scholarship in Preventive Medicine	Miss J. J. E. Turley
Walter F. Watkins Scholarship	E. P. Braaten

Second Medical Year

Dr. F. J. Colling Memorial Scholarship	P. M. Richardson
John Copp Bursary	T. W. Picton
Posluns Brothers Scholarship	S. Berger
Sandoz Prize in Pharmacology	P. N. Manley
Walter F. Watkins Scholarship	M. Bach

First Medical Year

Starkman Memorial Scholarship in Anatomy . . .	P. F. Halloran
Dr. C. S. Wainwright Memorial Scholarship . .	B. N. French
Walter F. Watkins Scholarship	P. F. Halloran
John Zoberman Scholarship	B. N. French

Second Premedical Year

Famous Players Canadian Corporation Scholarship .	S. H. Katz
Fulford Scholarship (No. 4 General Hospital) . .	N. D. Berman
William Edward Corlett Memorial Scholarship . .	N. D. Berman

ANAESTHESIA

Under the direction of Professor R. A. Gordon

The year has been marked by increasing frustration. The continuous development of an academic programme of teaching and research which the stature of this University demands will require a vast increase in human and material resources. The difficulties of carrying out a satisfactory teaching programme based on total reliance on part-time staff, who are hard pressed to meet their commitments for services to patients, the growing inadequacy of space and facilities for the prosecution of basic and clinical research, and the lack of financial support for research projects within the department are demoralizing. An early improvement in our resources is mandatory.

The teaching of undergraduate students in the third and fourth years was altered during the past session. In the third year, emphasis has been placed on resuscitation. As in the past, each fourth-year student has been attached for one week to an instructor who acts as preceptor, and he is expected to accompany the latter in his daily work. As before, the fourth-year students have been given a series of weekly two-hour clinics during the surgical term. In addition they have been required to show elementary proficiency in certain technical procedures which are considered essential to the contemporary general physician, and to complete a number of case reports. Our experience with this new approach is now being studied by a departmental teaching committee.

There were 38 postgraduate students in the Department during the year, 27 of whom were registered in the Diploma Course, the remainder being sessional students. The demand for postgraduate training in the department exceeds the number of appointments available for Residents and Fellows. While the standard of the Diploma Course is reasonably satisfactory, we are only too aware that our teaching could be improved in many ways, and both content and method of presentation are under constant critical examination. It has become increasingly evident that we require more full-time teachers. It is equally evident that the postgraduate student in this department should have more time free from service responsibilities for reading and for discussion of clinical problems with the staff responsible for his training. This can only be accomplished if the teaching hospitals will agree to increase their Resident establishments in the Department of Anaesthesia to a number in excess of those required purely for hospital service.

The Diploma in Anaesthesia of the University of Toronto was awarded to Dr. Joyce Harris, Dr. W. R. Lorimer, Dr. Leonard Te, and Dr. T. Witton.

The Department gave a one-week refresher course in November, 1964 for General Practitioners with a special interest and experience in Anaesthesia. A three-day course in the treatment of Respiratory Insufficiency was given during the same month in co-operation with the Departments of Medicine, Surgery, and Otolaryngology. Members of the Department have contributed to a number of postgraduate courses in other departments of the Faculty.

The sixth Dr. Harry Shields Lecture was given on November 13, 1964, by Professor Leroy Vandam of Harvard University Medical School. Professor Vandam's subject was "The Unfavourable Effects of Prolonged Anaesthesia."

The Department has been pleased to welcome a number of distinguished visitors during the year, amongst them the following: Dr. Jackson Rees, University of Liverpool, Liverpool, England; Dr. Digby Leigh, Los Angeles, California; Professor Leroy Vandam, Harvard Medical School; Dr. Tess Brophy, Brisbane, Australia; Professor E. A. Gain, University of Alberta; Professor Stuart Vandewater, Queen's University; Professor W. E. Spoerel, University of Western Ontario; Professor H. Orishejolomi Thomas, University of Lagos Medical School, Lagos, Nigeria; Dr. David Allen, Children's Memorial Hospital, Chicago; Dr. Robert Smith, Children's Hospital, Boston, Massachusetts; Dr. Hilary Howell, Royal Free Hospital, London, England; Dr. J. Sanders, Adelaide, South Australia; Dr. Louis J. Hampton, University of Pennsylvania; Dr. Gertie F. Marx, Albert Einstein School of Medicine, Yeshiva University, New York City; Dr. Gordon Bush, Alder Hay Hospital, Liverpool, England.

Dr. J. H. Moran joined the Department as a Clinical Assistant in July 1964.

Dr. Shirley Fleming has continued during the year as Professor and head of the Department of Anaesthesia of the University of Lagos Medical School in Nigeria. The Department is continuing to sponsor a programme of assistance to the Lagos school, with the financial assistance of the Educational Division of the External Aid Office of the Government of Canada.

Professor R. A. Gordon again visited the University of Lagos in January, 1964, on the invitation of the Dean of that school. During his visit he lectured on "Current Concepts of the Mechanisms and Treatment of Shock" and assisted in the formulation of further plans for the teaching of Anaesthesia to graduate physicians, both in the University of Lagos Teaching Hospital and in the General Hospital at Benin in Mid-West Nigeria. As chairman of the Membership Committee of the World Federation of Societies of Anaesthesiologists and on the invitation of Professor Fleming, Professor Gordon also attended the organizational meeting of the West African Association of Anaesthetists at the Ghana Medical School in Accra.

The Third World Congress of Anaesthesiologists held in São Paulo, Brazil in September, 1964 was attended by Professor Gordon, Professor A. W. Conn, and Dr. Shirley Fleming. All three took an active part in the programme of the Congress. Professor Gordon was one of the Canadian delegates to the Assembly of the World Federation of Societies of Anaesthesiologists and is a member of several committees of the Federation.

During the session the head of the Department visited the University of London Department of Anaesthetics at Hammersmith Hospital, and the Departments of Anaesthesia at the University of Pennsylvania and Columbia University, to discuss departmental organization and teaching and research programmes. All three visits provided valuable information. Professor Gordon also attended the annual meeting of the heads of the Departments of Anaesthesia of Canadian Universities in Charlotte-town on June 20th.

The hyperbaric chamber at the Toronto General Hospital came into use in July 1964, and Professor Barrie Fairley has been intimately involved in its operation and in the development in this centre of the medical applications of hyperbaric oxygen. Other members of the Department in the Toronto General Hospital are now collaborating in this work.

Members of the Department have co-operated in courses for Inhalation Therapy Technicians which have been given at the Hospital for Sick Children. Professor A. W. Conn has been appointed chairman of the Joint Committee of the Canadian Medical Association and the Canadian Anaesthetists' Society which is charged with the organization of training and qualification of Inhalation Therapy Technicians in Canada.

Dr. James Shapley has been appointed chairman of the Canadian Standards Association Committee on Safe Practices for Hospital Operating Rooms.

During the year the following lectures and addresses were given outside the University by members of the Department. DR. DOUGLAS BLENKARN, "Gas Exchange Disturbances in Patients with Chest Wall Injury," Canadian Anaesthetists' Society. DR. BEVERLEY BRITT, "Peripheral Nerve Injuries Associated with Anaesthesia," Ontario Chapter, College of General Practice of Canada. DR. A. W. CONN, "Paediatric Anaesthesia (Panel Discussion)," Third World Congress of Anaesthesiologists and at the Children's Hospital, Los Angeles, California; "Explosive Anaesthesia" and "The Uses and Misuses of Mechanical Ventilation in Infants," Seattle, Washington; "Pharmacology of Resuscitation in the Intensive Care Unit," Niagara Falls, New York; "Anaesthesia in the Neonate," Connecticut Society of Anaesthesiologists; "The Intensive Care Unit for the Paediatric Patient," Manitoba Division of the Canadian Anaesthetists' Society, Winnipeg; "Intensive Care and Inhalational Therapy," Children's Memorial Hospital, Chicago.

DR. H. B. FAIRLEY, "Respiratory Variables during intermittent Positive Pressure Breathing," Academy of Anesthesiology; "The Respiratory Intensive Care Unit," Niagara Falls, New York, Medical Society; "The Hyperbaric Chamber," Canadian Thoracic Society; "Principles in the Management of Respiratory Failure," American Society of Osteopathic Surgeons; "Respiratory Insufficiency," Halton County Medical Society; "The Hyperbaric Chamber," Section of Surgery, Ontario Medical Association; "Principles in Resuscitation," Peterborough Medical Society; "Effects of Variations in Inspiratory Flow Rate on Pulmonary Gas Exchange During Intermittent Positive Pressure Breathing," Canadian Anaesthetists' Society. DR. D. C. FINLAYSON, "Some Acid-Base and Electrolyte Problems Related to Anaesthesia and Surgery," Ontario Medical Association. DR. SHIRLEY FLEMING, "Anaesthesia in Nigeria," Third World Congress of Anaesthesiologists. DR. R. A. GORDON, "The Teaching of Anaesthesia in Developing Countries," (Panel Discussion), Third World Congress of Anaesthesiologists; "Mechanisms of Shock and Current Concepts of Treatment," University of Lagos Medical School; "Recent Concepts in Anaesthesia," Muskoka Medical Society; "Treatment of Shock," Michigan State Society of Anesthesiologists. DR. A. E. JOHNSTON, "Anaesthesia for Surgery for Tracheo-Oesophageal Fistula," Canadian Anaesthetists' Society. DR. R. L. MATTHEWS, "Anaesthesia for the Patient with Cardiac Disease," Ontario Medical Association. DR. I. A. J. SLOAN, "Anaesthesia for Bronchoscopy in Children," Hartford Connecticut.

RESEARCH

Professor H. B. Fairley, with the assistance of Dr. G. D. Blenkarn and Dr. Beverley Britt, has completed a study of gas exchange abnormalities produced by moderate chest wall trauma. This study was supported in part by a grant from the Department of Transport of the Province of Ontario. Dr. Fairley and Dr. Blenkarn have also completed studies of the effects on pulmonary gas exchange of variations in inspiratory flow rate during intermittent positive pressure ventilation, have evaluated the performance of a new electronic ventilator, and have compared the accuracy of the Campbell-Haldane and Hackney-Collier carbon dioxide analyzers. Dr. Fairley has continued his studies of the relative merits of various mechanical ventilators with respect to gas exchange circumstances and of the mechanics of respiration during intermittent positive pressure ventilation. This work has been assisted by grants from the Medical Research Council of Canada and the Connaught Medical Research

Laboratories Fund. Dr. Blenkarn was assisted by a Burroughs-Wellcome Award for Research in Anaesthesia.

With a grant from the Medical Research Council, Dr. James Kerr has continued his investigations of the effects of pregnancy on pulmonary mechanics, and has expanded his studies of the effects of smoking on total lung-airway resistance and of the effects of epidural anaesthesia on lung-airway resistance. Dr. Kerr has collaborated with Dr. Colin Woolf of the Department of Medicine in the evaluation of the effects of carotid body excision in the treatment of asthma, and has initiated a project to examine the value of differential spinal and epidural block in the assessment of back pain.

Dr. Brian Marshall and Dr. J. H. Moran have continued their study of the usefulness of various combinations of neuroleptic and analgesic drugs in general anaesthesia.

Professor Gordon and Dr. Moran have completed an extensive double blind study of the efficacy of a new non-narcotic analgesic drug in the relief of post-operative pain, and have instituted a study of the value of the same drug in patients with chronic pain.

At the Toronto Western Hospital, Dr. David Evans has studied the effects of moving patients under anaesthesia, with special reference to patients with fractured hips. Dr. William Jones has continued his study of alterations in liver function tests associated with halothane anaesthesia.

At St. Michael's Hospital, Dr. D. C. Finlayson, in collaboration with Dr. J. Goldie, has studied the use of low molecular weight dextran in the management of cardiogenic shock.

At the Hospital for Sick Children, Professor A. W. Conn and Dr. Leonard Te have investigated the effectiveness of a β -receptor blocking drug in dogs which have received intravenous transfusions of epinephrine during halothane anaesthesia. Dr. A. E. Johnston has reviewed the anaesthetic management of patients being operated upon for tracheo-oesophageal fistula.

Dr. Barrie Tobe has commenced a study to determine the value of measuring certain iso-enzymes as a method of assessing the effect of anaesthetics on hepatic function.

PUBLICATIONS

- BRITT, B. A. and GORDON, R. A. "Peripheral Nerve Injuries associated with Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 11, no. 5, Sept., 1964, pp. 514-48).
- HART, S. M., SLOAN, I. A. and CONN, A. W. "Methoxyflurane in Paediatric Cardiac Surgery" (*Canadian Anaesthetists' Society Journal*, vol. 11, no. 4, July, 1964, pp. 429-36).
- HENDERSON, J. C. and GORDON, R. A. "The Incidence of Postoperative Jaundice with special reference to Halothane" (*Canadian Anaesthetists' Society Journal*, vol. 11, no. 5, Sept., 1964, pp. 453-9).
- LAMONT, H. and FAIRLEY, H. B. "A Pressure-Sensitive Ventilator Alarm" (*Anesthesiology*, vol. 26, no. 3, May-June, 1965, pp. 359-61).
- MACKEY, I. M. "A Compact Anaesthetic Apparatus for Emergency Use" (*Canadian Anaesthetists' Society Journal*, vol. 12, no. 3, May, 1965, pp. 298-305).
- MARSHALL, B. M. "Air Embolus in Neurosurgical Anaesthesia: Its Diagnosis and Treatment" (*Canadian Anaesthetists' Society Journal*, vol. 12, no. 3, May, 1965, pp. 255-61).
- TASKER, R. R. and MARSHALL, B. M. "Analgesia for Surgical Procedures Performed on Conscious Patients" (*Canadian Anaesthetists' Society Journal*, vol. 12, no. 1, Jan., 1965, pp. 29-33).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1964-65 there were 1,354 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 30 different courses mentioned below:

UNDERGRADUATE COURSES IN ANATOMY

1.	Medical, First year	178	
	Art as Applied to Medicine	3	
	Rehabilitation Medicine Teachers' Course	2	
	Graduate Students in Anatomy	2	
2.	Medical, Second year, Neuro-Anatomy	151	
3.	Biology and Medicine, second year	44	
4.	Biology and Medicine, third year	33	
5.	Dental, first year	127	
6.	Dental Hygiene, first year	47	
7.	Rehabilitation Medicine, first year	110	
8.	Rehabilitation Medicine, second year	100	
9.	Rehabilitation Medicine, third year	115	
10.	Physical and Health Education, second year	88	
11.	Physical and Health Education, third year	85	
12.	Speech Pathology and Audiology	8	
13.	School of Embalming, first year	65	
14.	School of Embalming, second year	70	
		<hr/>	
		1,228	1,228

GRADUATE COURSES IN ANATOMY

15.	Radiology	14	
16.	Anaesthesia (diploma course)	13	
17.	Obstetrics and Gynaecology (advanced graduate course)	10	
18.	Ophthalmology	5	
19.	Otolaryngology	8	
20.	Dental Anatomy	12	
21.	Demonstrators in Gross Anatomy	6	
22.	Advanced Graduate Course in Surgery	34	
23.	Anatomy 6	6	
24.	Obstetrics and Gynaecology	8	
		<hr/>	
		116	116

UNDERGRADUATE COURSES IN MICROSCOPIC ANATOMY

25.	Medical, first year (included in item 1)	178	
26.	Biology and Medicine, third year (included in item 4)	33	
27.	Dental, first year (included in item 5)	127	
28.	Rehabilitation Medicine (included in item 7)	110	
		<hr/>	
		448	

GRADUATE COURSES IN MICROSCOPIC ANATOMY

29.	Graduate Dental Histology (included in item 20)	12	
30.	Graduate Histology	10	
		<hr/>	
		22	10
			<hr/>
	TOTAL		1,354

During the year 1964-65 several modifications were made in the courses given to the students of the first medical year.

The time allocated to Gross Anatomy was reduced by one hour per week, while that allotted to Microscopic Anatomy was increased by one hour per week. This enabled the Microscopic Anatomy course to be reorganized so that it now continues throughout the year, the students having three two-hour periods in the first half of the year and two two-hour periods in the second half. These alterations enabled us to fit in the Systematic Anatomy course in the first half of the year and greatly improved the arrangement of the Gross Anatomy course. These changes were also welcomed by the students who have always disliked finishing Microscopic Anatomy at Christmas and having their final examination in May.

In the course given to the Physical and Health Education students, the time allotted to Anatomy was reduced from three hours per week to two hours per week in the second and third years, and the whole course was reorganized.

The Biology and Medicine course in Gross Anatomy, I feel, is too short to give the students an adequate amount of basic anatomical knowledge and this will be a handicap to them when they reach their clinical years. There is no time at present to give them any Systematic Anatomy and they are learning it largely by simple memorization of anatomical facts.

The Department lost one member of the staff this year, Dr. M. C. Hall, who left to take up an appointment in Saigon under auspices of the External Aid Department of the Government of Canada. His sudden departure at the end of September, 1964 put an additional load on the teaching staff as it was impossible to replace him at such a late date.

Dr. A. G. Erwin joined the staff as a Demonstrator this year and is intending to take up Anatomical teaching and research as his full time career.

During the year the following papers were given by the members of the staff. Professor J. S. THOMPSON: "Transplantation of Male Mammary Glands to Female Mice" at the American Association of Anatomists, Miami, Florida, April, 1965. "The Effect of Acquired Tolerance on the Survival of Male Mammary Glands in Female Mice" at the Canadian Association of Anatomists at Ottawa, June, 1965.

RESEARCH

Dr. J. G. Ashby, working under the direction of Professor J. W. A. Duckworth, while in receipt of the Richardson Research Fellowship investigated a new method of Vertebral Arteriography. His project was to determine the feasibility of injecting the vertebral artery as it emerges from the transverse process of the second cervical vertebra. This work included a complete review of the literature on vertebral arteriography and also the injection of the artery in 25 subjects. He worked out the technical details of this procedure and has now reached a point where this method could be tried clinically.

Dr. Shinshil Chang, working under the direction of Dr. S. H. Bensley, completed her investigations into the effects of colchicine injections on the vaginal epithelium of female mice, with regard to possible tumorigenic effects. Her thesis was accepted in part fulfilment of the M.A. degree.

Dr. J. W. A. Duckworth has continued his studies on the effects of polyoma virus on the conducting tissue of the hamster heart with regard to its ability to produce tumours in this tissue at a time when it is undergoing its neonatal maturation.

Dr. A. G. Erwin, working under the direction of Professor J. S. Thompson, has been studying the effects of the transplantation of small portions of male mouse mammary glands into female mice of isologous strains. The effects are being studied with reference to the incidence of tumours and their age of occurrence.

Dr. K. O. McCuaig has been collecting anthropometric data from the Burlington Growth Clinic in order to assess growth at adolescence and its correlation with dental malocclusion. His studies are now in their fourth year.

Professor C. G. Smith in conjunction with Dr. F. Richardson has continued investigations into the arterial supply of the cerebral cortex. The data to date reveal that a special branch exists for the lower macular area in a large number of cases. The branches of the motor area are now being charted.

Professor J. S. Thompson has been studying the development of hyperplastic nodules and tumors in transplanted partial and whole mammary glands. He has also been carrying out investigations into possible genetic causes of structural abnormalities.

PUBLICATIONS

ALMEIDA, J. D. and HAM, A. W. "The Position of Oncogenic Viruses in a Classification Based on Particle Morphology" (*Progress in Experimental Tumor Research*, vol. 6, 1965, pp. 1-29).

GRANT, J. C. B. and BASMAJIAN, J. V. *A Method of Anatomy*. Baltimore: Williams and Wilkins. June, 1965. Pp. 900.

THOMPSON, J. S. "The Effect of Acquired Tolerance upon the Survival in the Female of Implanted Whole Male Mammary Glands" (*Proceedings of the Canadian Federation of Biological Sciences*, vol. 8, June, 1965, pp. 57-8).

——— "Transplantation of Whole Mammary Glands from Male to Female Mice" (*Anatomical Record*, vol. 151, no. 3, March, 1965, pp. 425-6).

ART AS APPLIED TO MEDICINE

Under the direction of Professor N. Joy

Three students will graduate at the 1965 Convocation. One has been appointed Assistant to the Director of the School and Department of Medical Illustration of the University of Texas, South Western Medical School, and the other two have a choice of jobs open to them in Canada.

Classes given to A.A.M. students by members of the staff of the Faculty of Architecture and the Faculty of Arts, Department of Fine Art, have been very successful in striking the balance our students need between training in the intuitive thinking required by artists and in the conceptual thinking required by scientists.

A dozen or so of the Medical Faculty's graduate students took advantage of the facilities of the Art Department and worked under the supervision of the A.A.M. staff to prepare illustrations for their theses at the end of last session, and more are expected to do so this year.

The Advisory Committee to the Department met once to review the directive of the Senate Committee on Diploma Courses in respect to the A.A.M. course. A subcommittee was appointed to inquire into the possibility of the course leading to a degree in the future.

In October, Miss Joy attended the annual meeting of the Association of Medical Illustrators in San Francisco, and in February, the meeting of the Council on Education of the Association, in Chicago, where the accreditation policy of the Association was discussed. The content of the three-year course at Toronto is much the same as the standard adopted and followed by schools in the United States of America all of which either award an M.A. now or are expected to by 1968.

Mrs. Muriel Miller collected an exhibit of work by Canadian Medical Illustrators for display at the Calgary Allied Arts Council at the end of February. Work of the students and staff of the A.A.M. Department was on display.

In March, Miss Mary Lorenc, Medical Illustrator and Instructor of Anatomy of New York University Medical and Dental Colleges, paid a three-day visit to the Department. She conducted several symposia with students and staff and was guest of honour at the Department's Open House.

In April, Miss Judith Gebhard spoke of the work of medical illustrators in the field of ophthalmology at the annual research meeting of the Department of Ophthalmology which was held at the Toronto General Hospital.

In May, after the examinations, the students and staff visited the University of Waterloo as guests of Mr. Kishmul Hahn, head of the Department of Photography. Mr. Hahn had invited two members of the staff of the University of Waterloo's Institute of Environmental Design to lunch to meet the A.A.M. party. Later the A.A.M. party was introduced to researchers and watched them operating a computer scribe that was drawing graphs.

Mr. Hahn explained the function of his Department which is chiefly concerned with setting up and supervising the photographic aspect of research projects. In some of these the camera is used not only to make a record, but as a tool to extend the range of the researchers' observations. At present a certain amount of routine work, such as making slides from flat copy, is undertaken but this work is increasing at such a rate that it will probably have to be handled by a separate and self-supporting service department. Mr. Hahn has recently been given a faculty appointment.

The list of subjects and number of hours give a picture of the three-year A.A.M.

course. The session is the same length as that of the Medical School, and Medical Art students write the same examinations as the regular students in all courses they take jointly with other groups. The pass mark required is 50 per cent.

The subject courses include, in the first year, 600 hours devoted to Anatomy, Embryology, and Histology; Pictorial Composition 20 hours; Life Drawing 36 hours; Studio Projects 280 hours; Surgical Drawing 114 hours. In the second year 64 hours are devoted to Neuroanatomy, 118 to Pathology, 38 to Ophthalmology, 48 to Anatomy, 150 to Photography, 18 to Colour Theory, 614 to Studio Projects and Field Trips. The third year includes 90 hours in Ophthalmology, 144 hours in Physiology, 6 hours in Radiology, 10 hours in Otolaryngology, 24 hours in History of Medicine (which may be taken in second year), 608 hours devoted to Studio Projects, Field Trips, Moulage Prosthesis, and 192 hours in Sculpture.

SERVICE DEPARTMENT

A temporary exhibit on Glucose Tolerance presented by Dr. A. M. Rappaport and Dr. M. Vranic and prepared in the A.A.M. Department, was shown at the International Diabetes Congress in Toronto during the summer of 1964. Miss Blackstock prepared most of the art work for this and for several documentary movies, filmed by Dr. Rappaport, to demonstrate the structure and the blood circulation in the liver lobule.

A permanent display was prepared for the Toronto Psychiatric Hospital to help in quick identification of pills that may have been swallowed by emergency patients admitted to the Forensic Clinic.

The crest of the Faculty of Medicine was the motif of a mural prepared by Mr. Lammerich to be hung outside the Dean's Office. Mr. Lammerich is working on a companion mural depicting the flowers that have medicinal properties.

The annual number of routine work requests has tripled during the past three years and several new part-time assistants have joined the Department. Mrs. Furness, who formerly did free-lance work for the A.A.M. Department, is now giving all her time to the Toronto Western Hospital to make charts and graphs for them.

A new I.B.M. typewriter, with large proportionally spaced type has made it possible for Mrs. Goodhead, the Department's secretary, to prepare approximately 150 charts and tables for projection as slides in much less time than was formerly needed when mechanical lettering templates were used.

BACTERIOLOGY

Under the direction of Professor Philip Greey

During the second term of the past session the large laboratory was divided into ten small rooms containing lockers, sinks, gas and electrical outlets, and capable of accommodating some eighteen to twenty students in each room. This change permits the students to work in comparative quiet and enables us to provide more small group teaching than in the past.

Dr. Marion Ross, Chief of Service, Bacteriology, at Sunnybrook Hospital, plans to retire this fall but will retain her assistant professorship, part-time, in the department.

Miss Lillian Holt joined the department as secretary, filling the vacancy created by the retirement of Miss Helen Boyd.

RESEARCH

Dr. R. C. French has continued the investigation of 'Mutual Exclusion between Bacteriophages.' Most of the preliminary physiological experiments have been performed. Essential antisera have been prepared and satisfactory conditions selected for

the rupture of bacteria. The biochemical, enzymatic, and tracer experiments are just being started.

Dr. G. H. Hawks, at St. Michael's Hospital, has continued to determine the sensitivity to penicillin of gonococci and the presence of auto-antibodies in thyroid disease using the tanned red cell technique.

Dr. T. E. Roy, at the Hospital for Sick Children, in association with Dr. Norma Chalvardjian has studied the content of the heat-labile antigens of *Bordetella pertussis* in strains isolated from patients with whooping cough and in the vaccines used to prevent the disease. It is well known that a small percentage of children who have received a full course of vaccination subsequently develop pertussis. Many of the vaccines were deficient in some of the antigens, suggesting that improved protection might be attained through correcting the deficiency. With Dr. P. C. Fleming, work has progressed on the purification of cephalosporinase.

Miss Joan Hennessy, in collaboration with Dr. W. B. Spaulding, Department of Medicine, has continued efforts to isolate a viral agent from specimens of lymph node pus aspirated from cases of cat scratch disease. Supplies of skin test material have been prepared for diagnostic purposes and sent, upon request, to all parts of the country. Following a report on the isolation of a Herpes-like agent from specimens of cat scratch disease pus, similar experiments in allantoic fluids of embryonated eggs were tried, so far without success. Experiments on removal of toxic agents from pus and concentration of remaining material are being carried out in an effort to prepare a better inoculum for tissue culture cells. Methods of demonstrating and culturing strains of PPLO from tissue culture cells are being examined and compared, and various chemicals and antibiotics used in attempts to eliminate these contaminants from cell lines.

The new antibiotic, Lincomycin hydrochloride, was studied to determine the effect against staphylococci and other pathogenic bacteria, cross-resistance with other antibiotics, and the rate of acquired resistance by staphylococci exposed to Lincomycin *in vitro*.

Bacteriological studies are continuing on patients undergoing transurethral prostatectomy with the Division of Urology, Toronto General Hospital, and, in collaboration with Dr. J. M. Finlay, Department of Medicine, are continuing on patients attending the gastro-enterological unit.

Dr. A. E. Franklin has continued studies on host cell-virus relationships using prednisolone, bacterial filtrates, and endotoxins. Cell lines under study include the FL line of human amnion, rabbit endothelial cells, the McCoy line of synovial cells, HeLa, Chang's liver cells, and Earle's 'L' cells. Viruses used include poliovirus 1, Cocksackie A6, A7, A9, A16, B5, B6, ECHO 9, vaccinia, mumps, measles, Herpes simplex, and yellow fever. In addition, a number of collaborative studies have been organized. Studies with Dr. J. F. Mustard include preparation of inoculated tissue cultures to see if these produce changes in the platelet aggregation phenomenon and preparation of concentrated virus stocks for platelet-virus relationships. Dr. H. Z. Movat is studying the effect of intact leucocyte granules, lysed granules, and antigen-antibody complexes on tissue cultures, in which subcellular changes are visualized by electron microscopy. A study with Drs. J. W. Steiner and Jézéquel involves acute stage infectious hepatitis specimens in tissue cultures, and subcellular changes are investigated using electron microscopic techniques. Dr. D. Gordon has supplied synovial fluid and blood specimens from patients with acute rheumatoid arthritis, which are inoculated to tissue cultures. Cytopathic effects have been studied from the point of view of transmissibility, association with platelet aggregation and cellular changes by electron microscopy. In addition, the development of new cell lines from such synovial fluid is being attempted.

Dr. J. C. Sinclair and his associates, Miss B. K. Buchner, M.A., and Mrs. L. Shreeve have continued the co-operative study with Dr. W. G. Bearcroft, West African Council for Medical Research, Lagos, Nigeria. They have also participated

in the conjoint study, organized by the United States Armed Forces Institute of Pathology, for the attempted isolation of agents from sera obtained in Korea from infectious hepatitis patients. Work has continued on the tissue culture agents isolated from patients with infectious hepatitis. Three have been shown to be related but not identical to Cocksackie A13; one remains unidentified. The significance of the isolation of a virus related to Cocksackie A13 is uncertain. Such an agent may have been, for a time, a commensal of the intestinal tracts of these patients. On the other hand, it may have been responsible for a concurrent illness in the foster home in which the cases occurred.

PUBLICATIONS

- BUCHNER, B. K. and SHREEVE, M. "Tissue Culture Isolation of Transmissible Agents from Infectious Hepatitis Patients" (*Canadian Journal of Public Health*, vol. 55, no. 7, July, 1964, pp. 299-302).
- HAWKS, G. H. *et al.* "The Effect of Providone-Iodine (Betadine) on Serum Protein-Bound Iodine, when used as a Surgical Preparation on Intact Skin" (*Canadian Medical Association Journal*, vol. 90, no. 23, June 6, 1964, pp. 1298-1300).
- ROY, T. E. "Antibiotics for Acute Bacterial Meningitis" (*Canadian Medical Association Journal*, vol. 90, no. 15, April 11, 1964, pp. 931-2).

BIOCHEMISTRY

Under the direction of Professor C. S. Hanes

During the past year 524 students have received instruction in the Department of Biochemistry, the distribution being as follows:

Faculty of Medicine (first medical year)	176
Faculty of Dentistry (first dental year)	125
Faculty of Arts, third year honour courses	91
fourth year honour courses	19
Graduates enrolled as Special Students in Faculty of Arts and Science	24
School of Graduate Studies	89
(a) Major subject Biochemistry	20
Post-doctoral Fellows	2
Candidates for Ph.D.	10
Candidates for D.Clin.Sci.	1
Candidates for M.A.	7
(b) From other departments	64
(c) Special Students	5
TOTAL	524

Members of the Department contributed 25 lectures and papers at congresses, symposia, and other scientific meetings during the year. Beginning in January, 1965, Professor J. Manery Fisher left on a nine-month study leave (the first ever to have been granted to a staff member of this Department); this she is spending mainly at the School of Biochemistry, Cambridge University. She spent two weeks at the Institute of Neurobiology in Goteborg, Sweden as the guest of Professor Holgar Hyden.

RESEARCH

Members of the Department have again received generous grants from the Medical Research Council of Canada and from the National Research Council of Canada, in aid of their programmes of research. In addition, a number of Foundations and other bodies have given invaluable help by providing grants to purchase special equipment and to support researches in special areas; such grants by the Atkinson Charitable Foundation, the Banting Research Foundation, the J. P. Bickell Foundation, the Canadian Arthritis and Rheumatism Society, the Ontario Heart Foundation, and the University of Toronto Cancer Research Committee are gratefully acknowledged.

Studies on the structure of elastin and its degradation under the action of elastase have been continued in the laboratory of Professors R. A. Anwar and C. S. Hanes. The first phase of the work has been completed and Mr. Ross Donovan who, with Professor Hanes, initiated the study, has completed his Ph.D. and returned to his post in industry. Professor Anwar has pursued the study of the fragments liberated by the action of elastase and the nature of the bonds cleaved. The size of the soluble fragments varied from single aminoacids to peptides containing up to 18 aminoacid residues. Under Professor Anwar's direction, Miss S. Carnegie undertook the separation and further characterisation of certain of the peptides liberated by the action of elastase, with a view to elucidating the structure of elastin. With the assistance of Mr. G. Oda (a senior undergraduate student), Professor Anwar made a comparison of elastins from different sources.

Professor Anwar has developed an experimental system, involving aorta tissue from chick embryo, for studying the incorporation of labelled precursors into desmosine and isodesmosine, newly-discovered aminoacids which appear to occur uniquely in elastin. He has demonstrated the incorporation of lysine into these compounds and is studying the incorporation of other possible precursors.

Professor G. E. Connell has collaborated with Dr. R. H. Painter of the Connaught Medical Research Laboratories in studying the instability of human γ -globulin preparations on storage. The instability has been attributed to slow proteolytic digestion, and the products of digestion have been thoroughly characterized.

In Professor Connell's laboratory Mr. M. H. Freedman completed his investigation of the proteins of normal human urine which are related to γ -globulin. He succeeded in showing that the two principal groups of components of low molecular weight are respectively monomers and dimers of the light polypeptide chains of plasma γ -globulin. The substances are, therefore, analogues of Bence-Jones proteins of various types. Mr. Freedman received his Ph.D. degree in November, 1964. In the later stages of his work he was ably assisted by Miss Nancy Hogg. Dr. A. F. Lewis has continued the collection and purification of Bence-Jones and myeloma proteins. Several of these proteins have been characterized by aminoacid and by ultracentrifugal analysis. Dr. A. Ozge-Anwar has continued her work on the role of Factor VIII (anti-hemophilic factor) in blood coagulation in collaboration with Dr. Mustard and Dr. Connell. She has obtained rigorous evidence that traces of thrombin convert Factor VIII to an activated state in which it acts more effectively in the generation of thromboplastin. Mrs. Brenda Tattrie has made good progress in her analysis of the disulphide cross-links in human haptoglobins of various genetic types. Also in Professor Connell's laboratory, Dr. A. Szewczuk, National Research Council Post-Doctoral Fellow from Poland, has carried on an incisive investigation of the properties of the enzyme, γ -glutamyl transpeptidase. He has demonstrated that iodoacetamide can be used to "label" a functional group in the active centre of the enzyme, and has made a preliminary study of the properties of the active centre. Dr. Szewczuk has also made important observations in regard to γ -glutamyl transpeptidase and related enzymes in human plasma and urine.

Miss Cynthia Jephcott, a summer student, has worked with Dr. E. J. Crossman of the Royal Ontario Museum and with Dr. Connell on a study of the serum and muscle proteins of the genus *Esox*. Her findings may help to clarify some of the uncertainties in classification of some species.

In Professor Fisher's laboratory the investigation of the uptake of phosphorus by frog muscle has been extended in several directions. Using a variety of procedures, Mrs. C. Dunkley has continued the separation and identification of the more soluble phosphorus-containing compounds which had become labelled with P^{32} after very short exposures to radioactive orthophosphate; different types of extraction solvents revealed a variety of labelled compounds. Using the techniques of thin film and paper chromatography as well as electrophoresis, Miss Doris Paterson investigated the labelled lipid and protein components of frog muscle in similar experiments. Mrs.

Dryden extended the kinetic study of P^{32} uptake and, with Mrs. Dunkley, investigated further the activity of adenylic deaminase found in intact isolated frog muscle. Dr. Barbara Hunt demonstrated that thin film chromatography and various ion exchange resins could be used to separate calcium from magnesium in the quantities found in small volumes of serum. Using a small resin column to separate red cell magnesium from hemoglobin, iron, and other interfering substances, a rapid and accurate method for the determination of erythrocyte magnesium was developed.

In Professor Hanes's laboratory, Dr. Albert Hercz has undertaken the study of pro-elastase from pancreas tissue which, on proteolysis by trypsin, yields active elastase. Professor Hanes has continued to collaborate with Dr. J. T. Wong (now at the College of Liberal Arts, Eugene, Oregon) in extending their generalised kinetic theory of enzyme action.

During his first year in this University, Professor T. Hofmann has continued three main lines of study which he had initiated previously in Seattle and in Sheffield. His studies on the chemical structure of ferritin and apoferritin have now proceeded to the point when the aminoacid sequences of the N- and C-terminal peptides are largely known. Mrs. S. Scrimger has continued the investigation of the active site of trypsin under Professor Hofmann's direction. The results of a study of the reaction of sodium nitrite with trypsin or its zymogen at low temperatures indicate that the N-terminal iso-leucine residue is involved in the active site. Dr. A. Thangamani, a Colombo Plan student from India, has undertaken a study of the biological significance of a peptidase from *Penicillium janthinellum* which is able to activate trypsinogen. Preliminary results indicate that the formation of the enzyme coincides with spore formation in the organism, but the two events can be separated by suitable inhibitors. The enzyme may be important as a mechanism of breakdown of cellular proteins to provide free aminoacids for the synthesis of new proteins. Evidence for this comes from experiments in which the transfer of log-phase organisms into a nitrogen-free medium was found to initiate production of the enzyme. Under Dr. Hofmann's direction Miss J. W. Dixon has investigated methods for the large-scale production of this enzyme and has found conditions under which high yields of enzyme can be obtained in a relatively short time.

Professor R. K. Murray has continued his studies of the enzyme profile of rat liver and of certain hepatomas. In particular, factors regulating the activity of the enzyme, sorbitol dehydrogenase, have been investigated. This enzyme has been shown to exist in rat liver in multiple molecular forms and the significance of this has been studied. Under Professor Murray's supervision Mr. M. Maung has continued his studies of rabbit haptoglobin and has separated several glycopeptides from it by proteolytic digestion. The structure of these fragments is under study. In collaboration with Dr. H. Z. Movat of the Department of Pathology, Miss Sofia Wasi has been investigating the properties of the acid cathepsins of leukocytes. These enzymes have been shown to be capable of digesting antigen-antibody complexes and the biological significance of this finding is under further study.

In Professor Schachter's laboratory, Mr. R. Lawford has developed a tissue slice system, which is capable of incorporating radioactive threonine and glucosamine into bovine submaxillary mucin. The subcellular sites of biosynthesis are being studied and it has been shown that the ribosomes and a membrane fraction are involved in this process. Dr. Schachter has continued his studies on chymotrypsin in collaboration with Dr. G. H. Dixon and Miss D. D. Wood. It has been shown that chymotrypsin catalyzes the formation of peracids in the presence of hydrogen peroxide and specific ester substrates. The peracid product then inactivates chymotrypsin by oxidizing tryptophane residues in the enzyme structure. Chemical modification of acetyl cholinesterase by hydrogen peroxide and by iodoacetate is also under study.

In Professor Williams' laboratory, Miss S. M. F. Ferguson has investigated the effect of malate upon the metabolism of isocitrate by isolated rat liver mitochondria.

She has demonstrated that the effect is exerted upon isocitrate metabolism in general and not on its oxidation alone. Indeed she can observe a stimulation of citrate production in the presence of antimycin. One possible explanation of her observations involves an allosteric effect on a membrane transport system. Miss S. C. Ruedy has investigated the effect of the metabolic state of mitochondria on the fate of isotopic carbon supplied as specifically labelled pyruvate. Her data have been interpreted as the result of an essentially complete block of malic dehydrogenase in the resting state, but it is not yet clear if this is simply a reflection of the high degree of reduction of mitochondrial nicotinamide nucleotide. Mrs. H. Jeng Tsai has continued her investigations of the chemistry of cytochrome *c* using starch gel electrophoresis to study the production of polymerized forms of the haemoprotein. Mr. K. A. Davis has compared the properties of yeast and of liver glyoxalase I and has demonstrated that the liver enzyme is cation-activated. This finding raises a number of questions regarding the mechanism of the glyoxalase I reaction as well as its biological significance. Professor Williams has continued his investigation of the dynamics of the tricarboxylic acid cycle by means of continuous detection of evolved $C^{14}O_2$.

The following students registered in the Department of Biochemistry completed work and presented theses for graduate degrees as follows:

Ph.D. degree:

DONOVAN, R. G., "The Enzymic Degradation of Elastin".

FREEDMAN, M. H., "Physicochemical and Immunological Studies on Gamma-globulins".

HERCZ, A., "Studies on the Mechanism of Preinduction and Induction of Beta-galactosidase of *Escherichia coli* B".

ISRAEL, Y., "Studies on the Biochemical Effects of Alcohol."

M.A. degrees:

ASTON, W. P., "Some chemical Modifications of Insulin."

ASTON, MRS. K. A. (nee Halliday), "The Chemical Modification of Bovine Trypsin."

B.Sc. (Med.) degree:

HAWKE, DR. MICHAEL, "Studies on Copper Metabolism."

PUBLICATIONS

DAVIS, K. A. and WILLIAMS, G. R. "An Autocatalytic Model of Possible Significance in Biochemical Switching Mechanism" (*Life Sciences*, vol. 4, no. 3, 1965, pp. 305-7).

—— "Liver Glyoxalase I" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 8, 1965, p. 15).

DIXON, G. H. and SCHACHTER, H. "The Chemical Modification of Chymotrypsin" (*Canadian Journal of Biochemistry*, vol. 42, 1964, pp. 695-714).

FERGUSON, S. M. F. and WILLIAMS, G. R. "The Effect of Malate upon Isocitrate Metabolism" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 8, 1965, p. 55).

FREEDMAN, M. H. and CONNELL, G. E. "The Heterogeneity of Gamma-Globulin in Post-Exercise Urine" (*Canadian Journal of Biochemistry*, vol. 42, 1964, pp. 1065-97).

—— "Monomer and Dimer Forms of Gamma Globulin Polypeptides in Normal Urine" (*ibid.*, pp. 1815-23).

FRENCH, I. W. and MANERY, J. F. "The Effect of Aldosterone on Electrolytes in Muscle, Kidney Cortex and Serum" (*Canadian Journal of Biochemistry*, vol. 42, 1964, pp. 1459-76).

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COMMITTEE ON ANIMAL CARE

Under the chairmanship of Professor A. G. Gornall

Another year has indicated that the new administrative arrangement is capable of functioning effectively. Three meetings of the Committee were held during the year. Requests for animal care were met as well as limited facilities would permit. Improvements in the description and salaries of non-academic positions have relieved somewhat the problem of staff turn-over. University support of the Animal Care facilities fell in 1964-65 from 40 per cent of the total budget to less than 30 per cent. This has meant an increased burden on research grant funds, which it is hoped can be relieved.

We record with regret the resignation of our veterinarian, Dr. Baer, who has served most conscientiously for the past five years, the last two as Director of Animal Care. Dr. Baer has also advised the Department of Psychiatry and the Faculty of Food Sciences on animal matters, and has given a series of surgical demonstrations and lectures to Art as Applied to Medicine students.

Reported by Dr. Harold Baer

The facilities of the Committee on Animal Care were used by 31 researchers in the 1964-65 academic year. Experimental animals housed included dogs, cats, guinea pigs, rats, rabbits, pigeons, calves, armadillos, and groundhogs. There were approximately 600 operations performed, compared to 370 in 1963-64. The majority were sterile procedures.

Diseases and parasitic conditions diagnosed in the animal colony included: (a) Dogs—canine distemper, infectious hepatitis, tracheobronchitis, gastroenteritis, rhinitis, and ecto- and endoparasites; (b) Cats—feline distemper, bronchopneumonia, enteritis, otitis, and ear mite infestation; (c) Rabbits—Pasteurellosis, pneumonia, conjunctivitis, mucoid enteritis, intestinal and hepatic coccidiosis, and ear

mite infestation; (d) Rats—chronic respiratory disease, rhinitis, and cestode infestation; (e) Guinea pigs—rhinitis.

The animal operating room facilities were improved by the purchase of new instruments and a Harvard respiratory pump. One rack each of stainless steel rabbit and rat cages were added to the animal boarding facilities.

MEDICAL BIOPHYSICS

Under the direction of Professor H. E. Johns

During the last year an honour was paid Professor L. Siminovitch when he received the annual Louis Rapkine Memorial Medal at the Institut Pasteur, Paris. Professor Siminovitch was also appointed to Section III of the Royal Society of Canada. Professor H. E. Johns received the award of the Canadian Association of Physicists Medal at the Annual Meeting in June, 1965, for his outstanding contribution to physics in Canada. Professor G. F. Whitmore was appointed for a four-year period to the Radiation Study Section of the National Institutes of Health as their expert in Radiobiology. Professor Howatson was appointed Consultant to the National Cancer Institute, National Institutes of Health, in connection with the Special Virus-Cancer-Leukemia Programme.

Undergraduate teaching. Professor Johns gave half of the course in Physics to premedical students. Professor Howatson gave Physics 460 to physics and biology students. Professor McCulloch gave the course in Clinical Microscopy. Professor Siminovitch gave 10 lectures in the Department of Microbiology.

Graduate teaching. Last year 32 students were enrolled in the Department doing graduate work towards the M.A. and Ph.D. degrees. Eight postdoctoral fellows pursued research studies in the Department.

Postgraduate teaching. Professors Axelrad, Bruce, Cinader, Howatson, McCulloch, Siminovitch, Till, and Whitmore gave postgraduate lectures for the Division of Postgraduate Medical Education. Dr. Wright gave lectures in the Diploma Course in Radiology and to the therapy and diagnostic technicians.

Members of the staff delivered lectures and/or papers as follows: Professor N. ASPIN on "An Analysis of Compartmental Deposition and Transfer Rates of Copper in the Rat," the Canadian Federation of Biological Societies, Halifax. Professor A. A. AXELRAD on "Quantitative Studies with Friend Leukemia Virus," the Cancer Research Unit of the University of Western Ontario. Professor W. R. BRUCE with B. E. MEEKER on "A Comparison of the Sensitivity of Normal Hematopoietic and Transplanted Lymphoma Colony-Forming Cells to Tritiated Thymidine and Vinblastine," the American Association for Cancer Research, Philadelphia; on "Radiobiological Studies of Transplanted Murine Lymphoma Cells," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto.

Professor B. CINADER on "Immunochemical Aspects of Therapy of Choriocarcinoma," the Academy of Medicine, Toronto; on "A Complement and Antigen Defect in Certain Inbred Strains of Mice," the Third Canadian Conference on Research in the Rheumatic Diseases, Arthritis and Rheumatism Society, Toronto; on "Studies on a Genetically-Determined Antigen and Complement Deficiency in Mice," the 10th Annual Meeting of the Genetics Society of Canada, Guelph; on "Antibodies to Enzyme" in the colloquium "Antibodies to Biologically Active Molecules," the 2nd Meeting of the Federation of European Biochemical Societies, Vienna; on "Recent Advances in Immunochemistry," the St. Thomas' Hospital Medical School, London, England; on "The Specificity of Acquired Immunological Tolerance and of the Antibody Response," the International Symposium on Tolerance organized by the Swiss Society of Immunology and Allergy, Locarno, Switzerland. Professor J. R. CUNNINGHAM on "The Concept and Values of Back Scatter Factor for Cobalt 60

Radiation," the Health Physics Division of the Indian Atomic Energy Establishment, Trombay, India.

Professor M. J. FRASER on "One Fundamental Approach to the Cancer Problem," the Cancer Society Meeting, Barrie; on "Studies on Glycine Activation in Rat Liver," the Toronto Biophysical and Biochemical Society; on "Protein Biosynthesis," "Glycine Activation in Rat Liver," the Department of Biochemistry, Queen's University, Kingston; on "RNA and Protein Synthesis," the Chemical Institute of Canada Colloquium on Nucleic Acids and Protein Synthesis, McGill University; on "Amino Acid Activation: Aminoacyl-RNA Formation," the Canadian Biochemical Society Symposium on Protein Biosynthesis, Ottawa. Dr. K. B. FREEMAN with P. V. HARIHARAN and Professor H. E. JOHNS on "Photochemistry of Cytidylyl-Cytidine (CpC)," the Ninth Annual Meeting of the Biophysical Society, San Francisco. Professor C. FUERST on "Defective Lysogeny," the Department of Biochemistry, University of Alberta; on "Genetic Aspects of Defective Lysogeny," the Tenth Annual Meeting of the Genetic Society of Canada, Guelph; on "Aspects of Defective Lysogeny in *Escherichia coli*," the Fifteenth Annual Meeting of the Canadian Society of Microbiologists, Laval University.

C. L. GREENSTOCK on "Pulse Radiolysis Studies in Liquids," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto. Dr. N. V. HAWKINS with I. HOPPETT on "A Technique for the Treatment of Post-Operative Carcinoma of the Breast on Cobalt 60 Kilocurie Teletherapy Units," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto. I. HOPPETT on "Compensation in Treatment Planning with Cobalt 60 Radiation," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto. Professor A. F. HOWATSON on "Physico-Chemical Characteristics of Tumour Viruses. Are They Different from 'Ordinary' Viruses?" the Department of Microbiology, University of Illinois; the School of Medicine, University of Chicago; the Sloane-Kettering Institute, New York. Professor J. W. HUNT with Dr. A. B. ROBINS on "The Effect of Metallic Ions on the Radiation Sensitivity and Free Radical Yields in Ribonuclease and Trypsin," the Association for Radiation Research, Cardiff, England.

Professor H. E. JOHNS with J. LEBLANC and Dr. K. B. FREEMAN on "Photochemistry of Cytidylic Acid," the Ninth Annual Meeting of the Biophysical Society, San Francisco; on "The Effects of Ultraviolet Light on DNA Components," the University of Manitoba, University of Alberta, Edmonton and Calgary; on "Recent Advances in Molecular Biology," the Medical Centre, Manitoba; on "Biophysics, the New Science," the University of British Columbia; on "Ultraviolet Lesions in DNA," the Washington Area Radiobiological Association, Bethesda, Maryland. P. K. LEUNG with Professor J. W. HUNT on "ESR Spectra of Free Radicals Produced in Irradiated Cyclohexanecarboxylic Acid," the Radiation Research Society, Philadelphia. D. M. LOGAN with Professor G. F. WHITMORE on "Dehydration of U.V. Irradiated Uridine and its Derivatives," the Ninth Annual Meeting of the Biophysical Society, San Francisco.

Professor E. A. McCULLOCH on "Control of Hemopoiesis Studied by the Spleen-Colony Technique," the Roswell Park Memorial Institute, Buffalo; on "Host-Cell Interactions in Mice Bearing Isologous, Hemopoietic Grafts," the C.N.R.S. Meeting on Grafting of Allogenic Hematopoietic Cells, Paris; on "Genetic Factors in the Control of Hemopoiesis," the Interurban Club, Toronto; on "Viruses and the Causation of Cancer," the Academy of Medicine, Kitchener—Waterloo; on "Studies on the Control of Spleen-Colony Formation," the Radiation and Recovery Conference, University of Texas, M. D. Anderson Hospital and Tumour Institute; on "Stem—Cell Functions in Haemopoietic and Immunologically Competent Systems," the Wistar Institute Symposium on Methodological Approaches to Study of Human Leukemias, Philadelphia; on "Studies on the Control of Hemopoiesis Using the Spleen-Colony Method," the Division of Medicine, National Institutes of Health, Bethesda, Mary-

land. F. P. OTTENSMEYER with Professor H. E. JOHNS and M. L. PEARSON on "The Use of Infrared Spectroscopy in the Elucidation of the Structure of Photoproducts Produced by the Ultraviolet Irradiation of DNA," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto.

Professor D. F. PARSONS with Professor G. R. WILLIAMS on "Correlation of Fine Structure of Mitochondria with Function," the Gordon Conference on Medicinal Chemistry; on "Density-Gradient Centrifugation of Sonicated Mitochondrial Fragments," the International Congress in Biochemistry, New York; on "Nature of the Mitochondrial Subunits," the Post Biochemical Congress on Mitochondrial Biochemistry, Malvern, Pennsylvania; on "Effect of Various Fixatives on the Cristae Subunits of Mitochondria and their Relation to Cytochemically Localized Mitochondrial ATPase," the Electron Microscope Society of America, Detroit; Professor PARSONS with Professors B. CHANCE and E. RACKER on "Structure and Function of Isolated Inner Membrane Subunits and of the Inner Membranes of Mitochondria Stripped of Subunits," the American Society for Cell Biology, Cleveland; Professor PARSONS with Professors B. CHANCE, E. RACKER and G. R. WILLIAMS on "Morphologic and Biochemical Characteristics of the Membrane Subunits of Mitochondria," the XIth International Congress in Cell Biology, Providence, Rhode Island; on "Structure and Function in Mitochondria," the Graduate School, University of Western Ontario; on "Structure of Mitochondrial Membranes," the Symposium on Cell Membrane Problems, State University of New York, Buffalo; on "Organization of the Lipid, Structural Protein and Enzymes of the Two Mitochondrial Membranes," the Montreal Neurological Society, McGill University; on "Electron Microscope Studies of Cells," the Nucleic Acids and Protein Synthesis Colloquium, Chemical Institute of Canada, Montreal. M. L. PEARSON of Professor Johns' group with D. M. LOGAN on "The Effects of U.V. Irradiation on Protein Synthesis *in vitro*," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists, Toronto.

Dr. A. M. RAUTH with Professor WHITMORE on "Effect of U.V. Light on the Colony Forming Ability of Synchronized *L* Cells when Plated in Medium Containing Caffeine," the Ninth Annual Meeting of the Biophysical Society, San Francisco. Dr. R. SHEININ on "Antiviral Substances," the New York Academy of Sciences; on "The Biochemistry of Infection with Polyoma Virus," the Department of Bacteriology, Kansas State University; on "The Biochemical Events Associated with Replication of Polyoma Virus," the Meeting on Biochemical Virology, Georgetown, Colorado; on "Thymidine Kinase Activity of Mouse Embryo Cells Infected with Polyoma Virus," the Federation of American Societies for Experimental Biology Meetings, Atlantic City. Professor L. SIMINOVITCH on "Proliferation and Differentiation in Hemopoietic Cells," Cold Spring Harbor, New York; the University of Glasgow and the Radiobiological Research Unit, Harwell, England; on "Control of Proliferation and Differentiation of Hemopoietic Stem Cells," the Albert Einstein College of Medicine, Yeshiva University, New York; the Rockefeller Institute, New York; Harvard Medical School and the Department of Microbiology, Tufts University, Boston; on "Proliferation and Differentiation of Hemopoietic Stem Cells," the University of Manitoba; British Columbia Cancer Institute; on "Genetic Control of the Proliferation and Differentiation of Hemopoietic Cells," the Salk Institute, La Jolla, California and the Public Health Research Institute, New York; on "Viruses and Cancer," Carleton University, Ottawa; on "The Chemical Basis of Heredity," St. Joseph's Hospital, Toronto; attended workshop on "Stem Cell Differentiation," Chicago; member of the Programme Committee of the American Association for Cancer Research, Philadelphia.

Professor J. E. TILL on "Proliferation and Differentiation of Hemopoietic Stem Cells," the University of Colorado Medical Center; the Ninth Annual Meeting of the Biophysical Society, San Francisco and the M. D. Anderson Hospital, Houston, Texas; on "Studies on Mice Bearing Genetically Determined Anemias, Using the

Spleen-Colony Method," the Symposium on Physiological Genetics at the 10th Annual Meeting of the Genetics Society of Canada, Guelph. Dr. D. J. WRIGHT with S. K. GUPTA and Professor CUNNINGHAM on "Computer Programs in Radiotherapy Treatment Planning," the Twenty-Eighth Annual Meeting of the Canadian Association of Radiologists. F. VALERIOTE with Professor BRUCE and B. E. MEEKER on "An *in vitro* Assay for Vinblastine," the Federated Society for Experimental Biology, Atlantic City. Dr. D. WEINBLUM with Professor JOHNS on "Isolation and Properties of Five Thymine Dimers," the Ninth Annual Meeting of the Biophysical Society, San Francisco.

Professor G. F. WHITMORE on "The Relevance of Mammalian Cell Radiobiology to Radiotherapy," a course of 10 lectures at the Penrose Cancer Hospital, Colorado Springs; on "Mammalian Cell Radiobiology as Applied to Radiotherapy," the Radiotherapy Department, University of Chicago; on "Mammalian Cell Radiobiology," the Radiological Society of North America, Chicago; on "The Effect of BUdR on Mammalian Cells and the Division Probability Model," the Biology Department, Washington University; on "Mammalian Cell Radiobiology as Applied to Radiotherapy," the Radiotherapy Department, Washington University; on "Repair Processes in Irradiated Mammalian Cells," the American Radium Society, New Orleans; on "Recent Advances in Cancer Research," the Ontario Division of the Canadian Cancer Society, Toronto; on "Radiation Effects in Synchronized Populations of Mammalian Cells," the Canadian Association of Physicists, Halifax.

RESEARCH

The research work of the Department entailed a great deal of collaboration between various members of the staff along the following lines: (1) Molecular Radiation Biology, (2) Structure of Viruses and Subcellular Particles, (3) Studies on Viruses, (4) Effects of Radiation and Drugs on Mammalian Cells, (5) Studies on Blood Forming Cells, (6) Immunological Studies, (7) Clinical Physics Applied to Radio-diagnosis and Radiotherapy, (8) Biochemical Studies.

Molecular Radiation Biology

Professor Hunt has been continuing to study the formation of reactive free radicals produced by ionizing radiation, and the subsequent changes which these radicals produce in the irradiated systems.

In collaboration with Dr. A. B. Robins of the Chester Beatty Institute, Sutton, Surrey, a study has been made of the protection of dry samples of the enzymes ribonuclease and trypsin by a wide variety of paramagnetic metallic ions. All the ions which protect the enzyme give a proportionate decrease in the yield of stable free radicals produced by radiation. With Mr. Haskill, the properties of irradiated ribonuclease are being studied in further detail. Chromatographic techniques have been developed which make it possible to separate the irradiated enzyme into damaged fractions, identified as "polymerized" and denatured components. A sensitive test based on the ability of the ribonuclease to refold into its native configuration has shown that considerable structural damage has occurred in the damaged fractions.

Professor Hunt, working with Mr. P. Leung, has been using electron spin resonance to study the transient free radicals produced by the irradiation of cyclohexane and its derivatives. In cyclohexane-carboxylic acid, the free radicals are produced by the removal of a hydrogen atom from the ring carbon to which the acid group is bonded. The free radical yields in mixtures of cyclohexane derivatives indicate that hydrogen transfer processes may play an important role in the production of specific free radicals.

Professor Hunt, with Mr. C. Greenstock, has been working on the design and construction of a pulse radiolysis system to be used with the new Linear Accelerator to be installed in the Physics building late in 1965. This 35 MeV electron accelerator will be capable of producing intense pulses of radiation with a duration as short as

10^{-8} seconds, and therefore will be ideal for the study of transient species in solution whose lifetimes range from 10^{-8} to 10^{-4} seconds.

Professor Johns, working with Professor Whitmore, Dr. Weinblum, Dr. Freeman, Dr. Rauth, and a number of graduate students, is continuing to study the nature of the lesions produced in DNA and RNA by monochromatic ultraviolet irradiation. These studies are performed on model compounds of DNA containing cytosine, thymine, and uracil.

Dr. Weinblum, with Professor Johns, has been able to isolate and characterize four types of thymine dimers produced by UV irradiation of frozen thymine, frozen thymidine, TpT, and the DNA from irradiated *E. coli*.

Professor Johns, with Dr. Freeman and Mr. P. V. Hariharan, has shown that the UV irradiation of cytidylic acid leads to the production of an unstable hydrate addition product which deaminates to give uridylic acid hydrate. Rates of reversal and deamination have been measured. Irradiation of CpC leads to dimers as well as hydrates. The dimers represented by CpC deaminate spontaneously to give mixed dimers (CpU) and finally UpU. The rates of deamination have been measured. Their findings show how a code change can result from UV irradiation with a change of base from C to U.

Professor Johns, with M. L. Pearson and I. Brown, has determined the types of photoproducts produced by the UV irradiation of UpU and poly U. The major photoproducts are hydrates and dimers. The cross sections for their production and reversal have been measured as a function of wavelength.

Professor Whitmore, with D. M. Logan, has irradiated poly U with UV light and has studied the effects of the irradiation on the ability of poly U to act as a messenger in the *in vivo* protein synthesizing system of Nirenberg. They have found that the stability of the hydrate photoproduct depends on the length of the poly U chain. The efficiency of protein incorporation also depends upon this chain length. The effects of U.V. on the binding of poly U to ribosomes is also being studied and the loss of binding is being explained in terms of the types of photoproducts produced in the messenger.

Structure of Viruses, Subcellular Particles, and Cell Components

Professor Howatson has continued his investigations on the structural characteristics of viruses and on the changes induced by viruses on host cells, especially those associated with the plasma membrane. The structure of normal cell membranes and the effects produced by surface active agents have also been studied.

Continued efforts have been made to detect viruses in association with human leukemia. Confirmation has been obtained of a recent finding of Zu Rhein and Chou of particles similar to papova viruses in brain tissue of patients suffering from progressive multifocal leukoencephalopathy, a rare demyelinating disease often superimposed on chronic neoplastic disease. It has further been found that the particles are structurally similar to polyoma or SV40 and are different from the papilloma viruses.

Professor Parsons has continued work on the organization of lipid and protein in mitochondrial membranes by carrying out integrated biochemical, electron microscope, and electron diffraction studies. High resolution electron microscopy of mitochondria has shown that the outer and inner membranes differ considerably in fine structure. Only the inner membrane and its extensions (the cristae) are covered with projecting subunits of 90 Å diameter. Previous work in collaboration with Professor G. R. Williams (Department of Biochemistry), Professor Britton Chance (University of Pennsylvania) and Professor E. Racker (New York University) indicated that the subunits form part of the oxidation phosphorylation system of mitochondria rather than part of the electron transport system (as suggested by other workers). The outer membrane shows no subunits of this type, but, in a number of mitochondria, has been shown to be porous, having holes of 28 Å diameter. In work

with Professor G. R. Williams and Dr. P. Wlodawer (visiting from the Nencki Institute of Experimental Biology, Warsaw, Poland) it was shown that the mitochondrial outer membrane ruptured during hypotonic swelling, while the inner membrane remained intact. This observation has formed the basis for developing a method of isolation and purification of the outer and the inner membranes of mitochondria. The enzymatic activities of the membrane fractions are being studied in collaboration with Professor G. R. Williams and Professor Britton Chance. The lipid contents are being examined by Professor W. Thompson (Best Institute and Biochemistry Department).

Electron diffraction studies are continuing using model systems of polyamino acids (poly γ -benzyl L-glutamate) and polyribonucleotides (poly A).

Attempts are being made to carry out diffraction on thin films of hydrated materials and to record small angle reflections corresponding to large spacings. Electron diffraction data on cell membranes can be used to determine the packing arrangements of proteins and lipids in the membrane.

Studies on Viruses

Professors Siminovitch and Fuerst are continuing studies of the physiological genetics of bacteriophage development, using mutants of λ bacteriophage that are unable to complete a normal cycle of growth in the host *E. coli* K 12. Mutants of two types have been isolated and characterized: Defective lysogenic strains of K 12(λ), in which mutation to defectivity has occurred in the λ prophage carried by the cells, and temperature sensitive mutants of λ , development of which can be blocked by raising the temperature of incubation to 40° C.

Mr. D. Mount and Mr. H. Eisen have pursued studies of the physiology and biochemistry of defective lysogenic strains, with emphasis on studies of the synthesis of a page-specific DNase, and synthesis of phage DNA and structural components of the λ particle. On the basis of this information and genetic data, obtained partly through collaboration with Dr. F. Jacob (Institut Pasteur) various regions of the λ chromosome can be identified with respect to their functions in phage growth. Similar studies are being carried out by Dr. Rosenberg and Mr. A. Harris with the temperature sensitive mutants.

Professor Fuerst has recently undertaken work on defective K 12(λ) strains of another type. These strains are distinguishable by the fact that the prophage carried by the cells has experienced substitution of a limited number of phage genes by host genes involved in the biosynthesis of the vitamin biotin.

Professors Siminovitch and Fuerst have isolated and characterized a few radio-sensitive mutants of *E. coli* K 12 and have shown that mutation to radiosensitivity has significant implications with respect to problems associated with phage development in K 12.

Dr. Sheinin has studied the effects of polyoma virus on host cells. In particular, attention has been focussed on the effect of polyoma virus on DNA metabolism in cells in which virus replication is proceeding. It has been found that host DNA synthesis is inhibited at about the time at which viral DNA synthesis commences. Preceding the onset of viral DNA synthesis in infected cells, enzymes involved in DNA synthesis are synthesized: these enzymes are thymidine kinase and DNA polymerase. The thymidine kinase formed has properties which differ from those of the enzyme present in uninfected cells.

Mr. J. F. Williams and Professor Till have continued their studies on the morphological transformation of rat embryo cells following infection *in vitro* with polyoma virus. They have found that intravenous injection of suitable numbers of infected cells into young animals will result in the formation of discrete colonies of transformed cells in the lungs of the recipient animals, and they have shown that the number of colonies obtained provides a reliable measurement of the frequency of transformation.

Professor Axelrad is investigating the mechanism of the process whereby a mammalian virus (the Friend virus) rapidly induces leukemic transformation in the spleens of mice. Professor Axelrad and Dr. R. A. Steeves have taken advantage of the focal nature of this process to develop a precise assay method which now permits a quantitative virological and genetic approach to the problem. In this way it has been found that among different strains of mice, there exist very great differences in susceptibility to leukemia induction by Friend virus, and that susceptibility is controlled by a limited number, probably only a single pair, of autosomal co-dominant genes. By isolation of leukemic foci from the spleens of susceptible infected mice, cells transformed by the virus have been obtained for study. These rapidly proliferating cells have been found to be actively engaged in virus production and the majority have been shown not to possess differentiated functions characteristic of mature cells of the hemopoietic system. Their fine structure is being examined with the electron microscope in collaboration with Professor Howatson. Morphological features which appear to be specific for transformed cells have been detected.

Mrs. Thomson working with Professor Axelrad, is completing a study of the radiosensitivity of Friend virus and is initiating experiments designed to elucidate the nature of the normal target cell in the spleen which is transformed by Friend virus.

Dr. Steeves has combined the virus assay method with standard immunological procedures and is comparing and classifying the new viral antigens which develop in the course of leukemia induction by Friend virus and other murine leukemia viruses.

Effects of Radiation and Drugs on Mammalian Cells

Professor Whitmore working with Dr. Pujara has completed his studies on the effect of BUdR on the growth and radiation response of mammalian cells. These experiments have led to the formulation of a model of cell growth in the presence of toxic substances which may also be applicable to certain radiation effects. The experiments also suggest that much of the apparent radiation sensitization produced by BUdR may in fact be an artifact of the method used to measure radiation effects. In addition to the studies with BUdR, studies on the effects of radiation administered at various times in the mammalian cell cycle have been continued, as well as studies on the ability of irradiated cells to recover from some of the sublethal effects of radiation.

Dr. Rauth in collaboration with Professor Whitmore has used the "window" technique of cell synchronization to study the effect of UV light on mouse L cells of various ages. The ability of these cells to form colonies has been shown to be a strong function of their position in the cell cycle at the time of irradiation. It was found that these cells are most sensitive to UV light early in their DNA synthetic period and most resistant at the end of DNA synthesis and the beginning of the premitotic G-2 period. This pattern of response to UV light is almost the reverse of that found for the same cell line when exposed to X-rays.

Dr. N. Bruchovsky and Professor Till have investigated the action of vinblastine sulphate on mouse L cells proliferating in cell culture, and have shown that this drug irreversibly inhibits the proliferation of cells that enter mitosis in its presence. Vinblastine was found to have no effect on the rate of progress of cells through the other phases of the cell cycle. A reversible inhibitor, phenethyl alcohol, which arrests the progress of cells into mitosis, prevented the irreversible inhibition of cell proliferation by vinblastine.

Professor Bruce had used the colony-forming assay for normal murine hemopoietic and lymphoma stem cells to examine the action of a number of chemotherapeutic agents *in vivo*. Drugs which have been studied include vinblastine, tritiated thymidine, 5FU methotrexate, different types of mustards, and 6 mercaptopurine. It has been demonstrated that a number of these agents exert a beneficial effect on tumour-bearing animals by virtue of the fact that they kill cells that pass through cell

cycle. Since the stem cells of marrow are normally not in cycle (or are cycling very slowly) while the cells of the tumour are proliferating rapidly, exposure to these agents leads to a pronounced difference in the survival of these two types of cells. This difference can be readily demonstrated at the cellular level *in vivo*. Mr. Valeriote, working with Professor Bruce, has examined the action of one of these agents, vinblastine, in some detail and with the aid of this drug has developed a technique for measuring the generation time of malignant cells proliferating *in vivo*.

Studies on Blood-forming Cells

Professors McCulloch, Siminovitch and Till have continued their studies of control mechanisms affecting differentiation and proliferation in the haemopoietic system, using the spleen colony method for detecting and assaying stem cells. The work has centered around the investigation of mice bearing specific mutations known to affect haemopoiesis. It has become apparent that these genetic loci may be classified into two groups. In the first group belong loci which exert their control within haemopoietic stem cells and their progeny; in the second belong loci which control features of the host environment in which haemopoiesis is occurring, and which affect the control of various aspects of the process. Previous work had indicated that the *W* locus belongs to the first class, and controls a feature intrinsic to stem cells which is required for them to express their capacity for spleen-colony formation, while *Sl*, is a locus of the second class controlling a host factor necessary for colony formation. During the present year a detailed study of the *f* locus has shown that it belongs to the first class, and controls a function necessary for rapid increase in erythropoietic activity. These three loci, *W*, *Sl*, and *f* are being investigated with a view to determining the mechanism of action of these genes.

In collaboration with Dr. Fowler, quantitative methods for studying granulopoiesis and erythropoiesis have been developed, and have been applied to the study of mice bearing mutations affecting haemopoiesis.

In collaboration with Dr. J. C. Kennedy and Dr. D. Syklocha, study of the cellular basis of immune-haemolysin production has continued. Dr. Kennedy has developed a useful assay for a class of mouse cells which respond to sheep erythrocytes by proliferation and differentiation, giving rise to a cohort of haemolysin-producing plaque-forming cells. Dr. Syklocha has studied the effect of the chemotherapeutic agent vinblastine sulphate on the production of haemolytic plaque-forming cells in response to antigen. It has been shown that antigen-sensitive cells are not normally in a state of rapid proliferation, but that an early event in the response to antigen is the initiation of proliferation.

Mr. R. Turner, with Professor Till, is investigating techniques which may be used to separate the different types of cells present in normal mouse hemopoietic tissue.

Immunological Studies

Professor Cinader has found an antibody which activates rather than inhibits the catalytic action of ribonuclease. This antibody brings about a configurational change in the catalytic area of the enzyme. The extent of activation depends on the molecular weight of the substrate and is thus affected by steric hindrance which reduces accessibility of the configurationally altered catalytic area.

Professor Cinader, in collaboration with Dr. Chi-tao Chou and Dr. S. Dubiski, has investigated methods by which young animals may be induced to make antibody to soluble antigens. Various populations of mammalian cells, obtained from adult animals, are treated *in vitro* with radioactively labelled antigen and are then transferred to newborn animals. The various types of cells are derived either from adult rabbits which have acquired immunological tolerance or from normal adult rabbits. Donors and recipients of cells are homozygous with respect to their gamma globulin allotypes and are of different allotypes. It is thus possible to distinguish between

antibody found in the circulation of recipients, which is made by the recipient, and antibody which is made by the transferred cells. They have found that antibody is being synthesized by the recipient of cells, except when thymus cells are transferred. In this case, a relatively high proportion of recipient animals have circulating antibody of both recipient and donor type.

Specificity of acquired immunological tolerance has been studied with rabbits which were injected with a native protein at birth and were immunized subsequently with a chemically modified derivative of the same protein. It has been established that antibody formed under such conditions is essentially directed against the modified portion of the tolerance-inducing antigen.

Professor Cinader, in collaboration with Mr. St. Rose and Professor M. Yoshimura, has examined similar systems in which the native protein was modified to different extents. The modified antigens were either human albumin, which had been di-azotized with para amino sulphonic acid, or human albumin modified with oxazolone; modifications consisted in the insertion of 8, 16, or 38 molecules of one of the two different haptens into each native molecule of protein. They have shown that the number of tolerant animals synthesizing antibody to the modified portion of the tolerance-inducing antigen depends on the number of groups in the modified protein. As immunization of the responding tolerant animals with modified protein progresses, "tolerance-breakdown" occurs, i.e. the formation of antibodies is observed, and these react vigorously with the native tolerance-inducing antigen. The conditions which promote this type of breakdown are being investigated.

On the basis of the above model experiments on the breakdown of acquired immunological tolerance, a programme on immunotherapy of cervical tumours is being pursued with Dr. Meakin. Patients are being immunized with their own tumours modified by di-azotization. So far 60 patients have been admitted to this programme.

Studies on molecular polymorphism of mice are being continued. Antibodies to several new allotypes of the immunoglobulins have been obtained. The discovery that a complement factor (C'5) is present in the serum of some inbred strains of mice and absent in the serum of other inbred strains of mice has been studied further. It has been shown that there are marked sex differences in the concentration of this factor, and the hormonal control of these differences is being investigated.

Clinical Physics Applied to Radiodiagnosis and Radiotherapy

Professor J. R. Cunningham, as technical assistant for the International Atomic Energy Agency, established a radiation protection service in Ceylon; with Dr. Wright, Miss Hoppett, Mr. Bellinger, and Mr. Webb, an automatic 3-dimensional milling machine to produce compensating filters for Co⁶⁰ treatment has been designed and built. With such filters, the skin spacing advantage of Co⁶⁰ can be maintained with a homogeneous dose distribution at the tumour regardless of the shape of the overlying skin contour.

Professor Cunningham, with Professor Bruce and Mr. Webb designed and built a Cs¹³⁷ irradiation unit for irradiating small animals to a uniform dose. Professor Cunningham with Mr. S. K. Gupta developed a method using an electronic computer for calculating distributions for non-uniform irradiation from Co⁶⁰.

Professor Baker with Mr. J. Scrimger has made a theoretical assessment of the scintillation camera to locate small amounts of radioactivity in patients. This has led to improvements in the design of the instrument and work is proceeding to incorporate the improvements in a redesigned transistorized version. During the past year an electronic method has been devised for placing anatomical reference markers on the camera scintiphoto display, as well as a method for extracting quantitative isotope distribution data by using a two-dimensional channel analyser in conjunction with the camera output.

Professor Aspin with the co-operation of the Institute of Biomedical Engineer-

ing has completed a scintillation camera for use at the Hospital for Sick Children. It will be used to study regional lung function in infants with respiratory distress syndrome using radioactive xenon techniques, and to study radioactive copper transport in patients with Wilson's disease.

Professor Aspin, working with Dr. Holmes and the Nuclear Reactor Division of McMaster University, has developed methods for measuring sub-microgram quantities of copper and zinc in biological tissues. The copper within a liver tissue sample taken by needle biopsy can be measured by these techniques. The estimate of the copper content of a patient's liver thus obtained is of value in assessing the effectiveness of treatment.

Professor Aspin and Professor Sass-Kortsak are continuing the radio-copper studies of patients with Wilson's Disease, and their families. These studies enable the asymptomatic patient to be distinguished from the other members of the family in order that early treatment with penacillamine can be initiated.

Biochemical Studies

Professor Fraser, with Dr. N. Begin-Heick, initiated a programme to study the *in vitro* coupling of a chromatin-dependent messenger RNA-synthesizing system with a ribosomal amino acid incorporating system. Both systems are derived from rat liver, the former from purified rat liver nuclei and the latter from rat liver microsomes and soluble fraction. These studies are preliminary to attempts to detect DNE-dependent synthesis of enzymes characteristic of liver and to a study of the control of protein biosynthesis *in vitro*.

Professor Fraser, with Mr. J. P. Bouchard, is continuing studies on the *in vitro* biosynthesis of amino acid acceptor RNA. Methods have been worked out for the purification in quantity of the small portion of the total DNA of mouse Ehrlich ascites carcinoma cells which acts as template for this RNA synthesis. This isolated mouse DNA has been used to make RNA in the presence of nucleoside triphosphates and *E. coli* RNA-polymerase. The physical, chemical, and biological properties of the product are under examination. Preliminary evidence indicates that the RNA, after incubation with a crude soluble enzyme fraction from the mouse tumour, can accept amino acids.

Studies of mammalian amino acid activating enzymes have been continued. Recently, a rat liver enzyme has been discovered which catalyzes glutamate-dependent ATP-³²PP exchange with a pH optimum of 5.5 and the formation of γ -glutamyl hydroxamate in the presence of hydroxylamine. The first reaction does not occur in the presence of ribonuclease suggesting that soluble RNA may be involved in maintaining the structural integrity of the active form of the enzyme. The relationship of this enzyme with another rat liver enzyme previously studied which catalyzes glutamate-dependent ATP-³²PP exchange with a pH optimum of 7.4 is under study.

Professor Stanners has examined the properties of messenger RNA produced by hamster embryo cells grown *in vitro*. It has been shown that labelled RNA precursors, after short incubation, appear exclusively in the messenger RNA component of cytoplasmic polyribosomes. Using this labelled material the sedimentation properties of cytoplasmic messenger RNA have been determined. In the presence of the drug puromycin, and labelled RNA precursor, these cells have been found to produce cytoplasmic RNA with the characteristic sedimentation properties of messenger RNA. Studies are in progress to prove conclusively that the latter labelled material is messenger RNA. If so, the procedure will provide a much desired source of highly labelled cellular messenger RNA.

With Mr. R. W. Reader and Professor Howatson, Professor Stanners has demonstrated that the ribosomes not participating in protein synthesis in cultured hamster embryo cells can exist as dimers under conditions where such ribosomes from other cell types exist only as monomers. The significance of this finding with respect to the mechanism of protein synthesis in these cells is being sought.

Professor Stanners is also engaged in studies of temperature sensitive mutants of polyoma virus.

Professor Whitmore with Mr. L. Prevec is investigating the biosynthesis of the different species of RNA in synchronized population of mammalian cells.

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MEDICINE

Under the direction of Professor K. J. R. Wightman

This has been a year of planning and uncertainty. The winds of change are reaching gale force, which may mean that some good things will be blown away with the bad. Nonetheless there is tremendous feeling of imminent progress and improvement.

In this Department several experimental ventures seem to be working out well, and have served as a stimulus to staff and students alike. The "decentralization" of the final year teaching, successfully introduced a few years ago, has been extended at the Wellesley Hospital to become a student internship. The students involved have enjoyed and profited from it. One's only fear is that the effectiveness of such an arrangement might deteriorate as the enthusiasm of the staff abates, and that

the service element of the experience will grow too rapidly at the expense of the academic portion. We need to reinforce the educational aspects of the junior internship and provide a final year clerkship designed to integrate theory and practice in a protected and closely supervised setting. Nonetheless, this is an experiment which will be repeated and watched with interest.

In the third year we have no change to report except in the assignment of clinical teachers. Instead of teaching students in the same year all four terms, they have been transferred from one to another, so as to give them a concept of the philosophy of instruction in all years, and an opportunity to see what progress the students are actually making. This produces a certain loss of continuity, and it is hoped that after a time it will be possible to identify the teachers who enjoy the work most in one year or another, since we subscribe to the view that instruction which the teacher enjoys is most likely to profit the student.

The course in Clinical Microscopy has been given a more clinical aspect, with good results. Paradoxically, this occurs at a time when a change in the orientation of haematology from Medicine to Pathology is being urged.

In the second year, a group of students was assigned to the Toronto Western Hospital for all their instruction, including lectures. A series of evening meetings was held at the Hospital, to which all teachers were invited, to discuss the content and methods of the course. This project was very successful and very stimulating. We are considering a "school for teachers" within the Department, since we have so many new recruits. Dr. William Oille has signified his intention of returning to active duty in the Department, now that his Curriculum Committee has submitted its report. He has worked very hard, and has put forward many constructive suggestions. He will help us greatly in our future study of teaching within the Department.

The planning activities have ranged from broad principles of organization to details of hospital construction. We are heartened by the expansion which is planned at all the teaching hospitals, and particularly by the interest which is being taken in the need for research laboratories, which are the "operating rooms" of a Department like this.

The increase in enrolment which has been announced will tax this Department perhaps more than most. We feel that it can only be dealt with successfully if the greatest flexibility and imagination are brought to bear on its problems. Many novel and unconventional approaches may be needed. We will require more full-time teachers and more time from our part-time teachers. We are considering the means to be taken to preserve our teaching units, the arrangements within each hospital to organize its services and the method of remuneration of the University staff who work in them. The need for integration of the special functions of each of the teaching hospitals is more evident than ever. As usual the main problem is one of ensuring communication and collaborative effort.

The Department suffered grievous loss in the death of Trevor Owen, Almon Fletcher, and Ray Farquharson. Each of these men in his own way contributed a special legacy, which will exert its influence for many years to come.

Dr. Jean Davey has decided to resign her post as Physician-in-Chief at the Women's College Hospital but will accept a new challenge in developing a teaching clinic in the Outpatients Department at that Hospital. We are fortunate to have Dr. F. M. Hill to succeed her as Physician-in-Chief. Dr. Albert Crowther has reached retirement age after many faithful years in the Diabetic Clinic and Chest Clinic at the Toronto General Hospital. He has been appointed graduate lecturer and we hope to have the benefit of his counsel for many years to come. Dr. B. E. Hazlett has agreed to take on direction of the Diabetic Clinic.

Dr. J. L. Silversides has been appointed Physician-in-Chief of the Alcohol and Drug Addiction Foundation, and is working in a geographic full-time capacity at the Toronto Western Hospital in addition. Dr. John Spears has instituted a study of adverse reactions to drugs at the Toronto General Hospital and Women's College

Hospital, and is participating in a reporting programme arranged by the Food and Drug Directorate in Ottawa.

Dr. William Spaulding was appointed Associate Dean (Student Affairs), but has fortunately been able to continue as Head of the Medical Outpatients Department of the Toronto General Hospital.

Dr. John Evans has been appointed Dean of the Faculty of Medicine, McMaster University. We shall miss him greatly and wish him all success and happiness. We are also sorry to lose Dr. David Lewis, who has accepted a full-time post in the Department of Psychiatry, McGill University.

Notwithstanding these losses, the Department is still expanding, and we look forward to further growth and improvement. The years ahead promise to be interesting, challenging, and demanding. The success which we hope awaits us will depend entirely on the degree to which we can continue in the present spirit of cooperation and goodwill, for which I wish to express my sincere appreciation.

We have enjoyed a great many visits from a wide variety of people and from many parts of the world. Some of them have come to assist in courses or deliver lectures under the aegis of the Division of Postgraduate Medical Education. Others have come specifically to visit such units as the Cardiac Infarction Unit, the Blood and Vascular Disease Research Unit, or other special facilities in the Department. The visitors included Dr. G. E. Bauer, Melbourne, Australia; Dr. W. B. Castle, Boston; Prof. Cruikshank, Kingston, Jamaica; Dr. T. E. Cuddy, Winnipeg; Dr. R. Fraser, Edmonton; Prof. Russell Fraser, London, England; Dr. E. J. Freireich, Bethesda, Maryland; Dr. J. E. French, University of Oxford, England; Dr. E. Giblett, Seattle, Washington; Dr. A. Goble, Melbourne, Australia; Dr. F. Gorstein, New York; Dr. I. Harary, Los Angeles, California; Dr. M. Hartog, Hammersmith Hospital, London; Dr. H. Jason, University of Rochester, Rochester, N.Y.; Dr. H. C. Kallfetz, Bonn, Germany; Dr. A. Kelus, University of Birmingham, England; Dr. H. Mackinnon, Fredericton, N.B.; Dr. J. A. Marsden, Victoria, New Zealand; Dr. J. McCreary, Vancouver; Dr. H. McIlwain, London, England; Dr. M. Minims, Udine, Italy; Dr. J. Mohn, Buffalo, New York; Dr. H. B. Newcombe, Chalk River; Dr. Celia Oakley, London, England; Dr. J. O'Brien, Portsmouth, England; Dr. D. Osoba, Vancouver; Dr. R. R. Race, London, England; Dr. S. Reid, Montreal; Dr. H. C. Rumke, Utrecht; Dr. I. Rusted, St. Johns, Newfoundland; Dr. E. Sandoe, Copenhagen, Denmark; Dr. R. Sanger, London, England; Dr. B. Selverstone, Boston; Dr. S. Shane, Halifax; Dr. W. B. Sherman, New York; Dr. O. Smithies, Madison, Wisconsin; Dr. Stock, New York; Dr. B. Sullivan Jr., Cleveland; Dr. M. J. C. Tsapogas, London, England; Dr. A. J. Zweifler, Ann Arbor, Michigan.

Members of the Department have presented scientific papers at local, regional, national, and international levels, as well as participating in the courses arranged for the Postgraduate Division. In many cases, these represent a financial sacrifice as well as a considerable expenditure of time and effort. While they add to the reputation of the individual concerned, they also add to the stature of the faculty of the University. These efforts are much appreciated and it is heartening to note that increasing support is becoming available for them. The following list is probably not entirely complete but will exemplify the range of this activity.

Dr. E. C. ABBOTT, American Federation for Clinical Research, Atlantic City. Dr. H. E. ALDRIDGE, Inter-American Congress of Cardiology, Montreal. Dr. E. F. W. BAKER, International Congress re LSD Psychotherapy, Long Island, N.Y. Dr. H. J. M. BARNETT, Neurological Postgraduate Series, Queen's University, Kingston, Lincoln County Medical Academy; Canadian Neurological Society Meeting, Halifax. Dr. R. BAUMAL, Third Canadian Conference on Research in the Rheumatic Diseases, Toronto; American Rheumatism Association, Philadelphia. Dr. D. BEANLANDS, The Inter-American Congress of Cardiology, Montreal. Dr. D. E. BERGSAGEL, Xth Congress of the International Society of Haematology, Stockholm; Joint meeting of the Toronto Biochemical and Biophysical Research Society and the Clinical Research

Society of Toronto; American Association for Cancer Research and the American Society of Clinical Oncology, Philadelphia; 8th Annual Ohio Cancer Conference, Columbus. Dr. B. BERRIS, Kellogg Foundation, Welland. Dr. I. BRODER, Canadian Society for Clinical Investigation, Toronto; Third Canadian Conference on Research in the Rheumatic Diseases, Toronto; American Association of Immunologists, Atlantic City; American Rheumatism Association, Philadelphia; Interurban Meeting, Toronto. Dr. K. W. G. BROWN, Ontario Medical Association, Bracebridge. Dr. A. W. BRUCE-ROBERTSON, Canadian Symposium in Radiobiology and Radiation Dosimetry, Chalk River.

Dr. A. W. CHISHOLM, Kitchener-Waterloo Academy of Medicine; North Peel Medical Association. Dr. W. T. W. CLARKE, Queen's University, Kingston; Academy of Medicine, Hamilton; Student Christian Movement, University of Toronto. Dr. M. COHANIM, Royal College of Physicians and Surgeons Annual Meeting, Toronto. Dr. J. S. CRAWFORD, Canadian Medical Association Convention, Vancouver; Ontario Hospital Association, Toronto. Dr. J. H. CROOKSTON, Workers' Educational Association, Toronto. Dr. J. DAVEY, Clinical Session, Toronto Section, College of General Practice. Dr. S. DUBISKI, 10th Annual Meeting, Genetics Society of Canada, Guelph; Third Canadian Conference on Research in the Rheumatic Diseases, Toronto. Dr. J. R. EVANS, Queen's University, Kingston; Canadian Society of Clinical Investigation, Toronto; Federation of American Societies for Experimental Biology, Atlantic City; McGill University, Montreal. Dr. C. EZRIN, Roswell Park Memorial Institute, Buffalo; Montefiore Hospital, New York Medical Centre.

Dr. J. M. FINLAY, International Federation of Diabetes, Toronto. Dr. J. D. L. FITZGERALD, Medical Education Division, University of Western Ontario, London. Dr. D. GORDON, 3rd Canadian Conference on Rheumatic Diseases, Toronto; Interurban Arthritis Club, Rochester, N.Y. Dr. C. C. GRAY, Royal College of Physicians and Surgeons Annual Meeting, Toronto. Dr. W. F. GREENWOOD, Postgraduate Clinic in Cardiology with Dr. James Key, Port Arthur; Inter-American Congress of Cardiology, Montreal. Dr. R. HASSELBACK, Postgraduate Medical Course, Queen's University, Kingston. Dr. H. P. HIGGINS, Peterborough Medical Society. Dr. J. B. HOUP, Canadian Rheumatism Association, Vancouver; Royal College of Physicians and Surgeons Annual Meeting, Toronto; Third Canadian Conference on Research in the Rheumatic Diseases, Toronto; American Rheumatism Association, San Francisco. Dr. J. C. LAIDLAW, International Congress of Endocrinology, London, England; Academy of Medicine, Kitchener; Kingston General Hospital; Middle East Medical Assembly, Beirut, Lebanon. Dr. S. LENKEI, Inter-American Congress of Cardiology, Montreal. Dr. A. LITTLE, American College of Physicians, Atlantic City.

Dr. E. A. McCULLOCH, Roswell Park Memorial Institute, Buffalo; C.N.R.S. Meeting on Graft of Allogenic Hemotopoietic Cells, Paris; Radiation and Recovery Conference, University of Texas; Wistar Institute Symposium on Methodological Approach to Study of Human Leukemias, Philadelphia; Division of Medicine, National Institutes of Health, Bethesda, Md.; Sixth Canadian Cancer Research Conference, Honey Harbour; Third Canadian Conference on Research in the Rheumatic Diseases. Dr. W. J. McILROY, Ontario Conference on Multiple Sclerosis, Toronto; Multiple Sclerosis Society of Canada, Toronto Chapter. Dr. R. L. MACMILLAN, College of General Practice, St. Catharines; Postgraduate Course for General Practitioners, Belleville. Dr. J. W. MEAKIN, Queen's University, Kingston. Dr. J. F. MUSTARD, International Committee on Blood Clotting Factors, Amsterdam; Gordon Research Conference, New London; Symposium Thrombo-embolic disease, Basle, Switzerland; American Society for the study of Atherosclerosis, Atlantic City; Cleveland Clinic, Cleveland Ohio; Canadian Society for Clinical Investigation, Toronto; Montreal Medical Chirurgical Society, Montreal; British Society of Haematology, Sheffield; American Society for Experimental Pathology, Atlantic City; National Conference on Cardiovascular Diseases; Third Canadian Conference on Research in the Rheumatic Diseases. Dr. M. A. OGRYZLO, Canadian Association

Medical Technologists, Toronto; American Rheumatism Association, San Francisco; Conference on Gout and Purine Metabolism, Princeton; Muskoka Medical Society, Bracebridge; Third Canadian Conference on Research in the Rheumatic Diseases.

Dr. J. F. PATERSON, College of General Practice. Dr. R. Pos, Imperial Oil Company, Toronto; Canadian Mental Health Association, Winnipeg; Canadian Psychiatric Association, Halifax; American Academy of Psychosomatic Medicine, New York. Dr. A. J. PRESTON, Ontario Multiple Sclerosis Society; Canadian Underwriters Association; Dr. E. PROKIPCHUK, North Bay Medical Society; Royal College of Physicians and Surgeons, Annual Meeting, Toronto. Dr. A. RAPOPORT, Toronto Diabetes Society; Ontario Hospitals Association; Academy of Medicine, Hamilton; Royal College of Physicians and Surgeons, Toronto. Dr. P. S. ROSEN, Essex County Medical Society, Windsor. Dr. G. SERENY, Alcoholic Research Meeting, New York. Dr. J. L. SILVERSIDES, Niagara Frontier Medical-Legal Society; Middle Management Seminar on Alcoholic Problems, Niagara Falls. Dr. H. A. SMYTHE, Newfoundland Medical Association; Pittsburgh Rheumatism Association; Conference on Gout and Purine Metabolism, Princeton; Third Canadian Conference on Research in the Rheumatic Diseases. Dr. W. B. SPAULDING, Chairman, Annual Meeting, American Association for the Advancement of Science, Montreal; Moderator, Royal College of Physicians and Surgeons.

Dr. J. A. WALTERS, International Symposium on Pain, Ford Hospital, Detroit. Dr. K. J. R. WIGHTMAN, College of General Practice of Canada, Alberta Division; Upstate New York and Ontario Regional Meeting, American College of Physicians; Committee on Aging, Legislative Assembly, Toronto; Geriatrics Committee, College of Physicians and Surgeons, Saskatchewan; Symposium, Antibiotic Therapy; Muskoka Medical Society, Bracebridge; Royal College Symposium, Hypertension. Dr. E. D. WIGLE, 7th Annual Postgraduate Day of the Essex County Medical Society, Windsor; Symposium, Experimental and Clinical Aspects of Pharmacogenetics, Atlantic City; American College of Cardiology, Boston; Inter-American Congress of Cardiology, Montreal. Dr. J. K. WILSON, Canadian Medical Association, Vancouver; Peterborough Medical Society, Peterborough; American College of Physicians. Dr. C. WOOLF, Ontario Thoracic Society; Halton County Medical Association; Canadian Thoracic Society 65th Annual Meeting, Toronto; American College of Chest Physicians, New York; Royal College of Physicians and Surgeons, Annual Meeting. Dr. E. R. YENDT, Regional Meeting of the American College of Physicians, Buffalo; Western Ontario Section, Canadian Association of Radiologists, London; Interurban Club, Toronto; Royal College of Physicians and Surgeons, Annual Meeting, Toronto.

RESEARCH

Research activity is still expanding, and the pressure for space, equipment and financial support is mounting at a rate which exceeds the increasing funds available. We are deeply indebted to many individuals and corporations for donations they have made. These have added tremendously to the morale and effectiveness of our clinical investigators. We are also grateful, of course, for the funds which have been allocated to us by the Medical Research Council and the various voluntary agencies, but these other contributions have been a most important addition. I think one can fairly say that they have made possible a large number of the studies listed below, and have been justified by the skill and dedication of the research workers in the Department.

While one would wish to describe this work in full detail and to indicate the areas in which the most significant contributions have been made, space permits nothing more than a catalogue of the projects underway at the various hospitals.

Alcoholism

Dr. G. Sereny at Toronto Western Hospital—metabolic studies in the acute withdrawal stage in chronic alcoholism.

Allergy-Immunology

Dr. R. Bladek at Toronto Western Hospital—clinical and immunological aspects of insect anaphylaxis. Dr. I. Broder with Dr. R. Bauman at Toronto Western Hospital—effects of soluble antigen-antibody complexes and their site of activation in the tissue; bioassay method for measurement of such complexes, and a study of similar complexes in the serum of rabbits injected with a foreign protein and in persons with rheumatoid arthritis. Dr. S. Dubiski at Toronto Western Hospital—study of the polymorphism of serum proteins and the effect of specific iso-antibodies on their formation. Dr. J. D. L. FitzGerald at Toronto Western Hospital—research in clinical allergy. Additional work in this field is reported under the various organ systems.

Atherosclerosis and Blood Coagulation

Dr. Roslyn Herst at Toronto General Hospital—a variety of studies in clinical coagulation problems. Dr. Fraser Mustard at Blood and Vascular Disease Research Unit with Dr. M. F. Glynn, Dr. T. Hovig, Dr. L. Jørgenson, Dr. H. C. Rowsell, and Dr. M. Packham—the interaction of platelets with surfaces and with each other: the ability of platelets to phagocytose latex particles, immune complexes, and other materials, together with their ability to release factors which increase vessel permeability, have been correlated with reactions of platelets with collagen, and factors which will interfere with this are being investigated; the structure of hemostatic plugs in hemophilic dogs has been demonstrated to be abnormal; the effects of adenosine-di phosphate in inducing platelet aggregation and arterial thrombi in the pig have been investigated further, as well as the type of lesion produced when these thrombi resolve. Dr. David Watt at the Toronto General Hospital—has developed a machine for carrying out clotting times on an automatic basis, which it is hoped will allow clinical studies of blood coagulation in non-wettable containers.

Cardiovascular Disease

Dr. D. S. Beanlands and Dr. D. F. Folkins at Toronto Western Hospital—have been studying the angiotensin infusion test, the use of Ethacrynic Acid and the application of counter-pulsing and paired electrical stimulation in various disturbances of cardiac function. Dr. K. W. G. Brown and Dr. R. L. MacMillan at Toronto General Hospital—have studied acute myocardial infarction in a special unit with continuous electrocardiographic monitoring, and more recently pulse pressure monitoring; they are incidentally studying a variety of other factors in the acute treatment of cardiac infarction; 465 patients have now been treated in the Unit. Dr. Harold Fields at St. Michael's Hospital with Dr. D. C. Finlayson and Dr. J. Goldie—investigation of treatment of cardiogenic shock with low molecular weight dextran. Dr. A. J. Kerwin at Toronto Western Hospital—study of continuous ECG taping. Dr. J. C. Laidlaw with Dr. E. C. Abbott at Toronto General Hospital and Miss M. Stiefel—inhibition of aldosterone secretion in hypertensive patients with a new semi-synthetic mucopolysaccharide, effective in primary aldosteronism; studies of hypertensive patients who have hypokalemia and increased aldosterone secretion. Dr. A. Rapoport at Toronto Western Hospital—effects of prolonged renal artery constriction in the dog. Dr. W. B. Spaulding at Toronto General Hospital—a computer-aided study of the differential diagnosis of chest pain. Dr. E. D. Wigle at Toronto General Hospital with Dr. H. Aldridge, Dr. G. B. Peckham, Dr. A. Chrysohou and C. J. Labrosse—studies of the pulmonary hypertension associated with mitral disease; investigation of the genetics, hemodynamics, ECG changes and treatment of muscular subaortic stenosis; investigation of the disorder of function produced by aneurysm of the left ventricle; review of patients whose mitral valve has been replaced by a Starr-Edwards prosthesis. Dr. J. K. Wilson at St. Michael's Hospital—long term follow-up of cases with atrial fibrillation after reversion to normal rhythm; study of Dilantin in cardiac arrhythmias. Dr. E. R. Yendt, with Dr. M. Cohanin and Dr. R. Gagne at Toronto General Hospital—investigation of patients with renovascular hypertension, using differential renal

function tests, radioactive renograms, renal biopsy, renin assay, angiotensin assay and angiotensin infusions.

Dermatology

Dr. H. Haberman at Toronto Western Hospital—antigens of melanocytes and keratinocytes. Dr. A. W. Hudson at St. Michael's Hospital—pseudocholinesterase levels in psoriatic subjects; effects of Florandrenalone and locacorten. Dr. M. G. Williams at Princess Margaret Hospital—fluorescent antibody studies in psoriasis to detect bacteria and other antigens.

Endocrinology

Dr. C. Ezrin at Toronto General Hospital—investigation of thyroxin transfer rates; study of the effect of induced mild hyperthyroidism on obesity; continued investigation of pituitary cytology. Dr. H. P. Higgins at St. Michael's Hospital—investigations of non-toxic goitre and thyroiditis. Dr. J. C. Laidlaw with Dr. D. J. Sutherland at Toronto General Hospital—a study of the physiological role of corticosterone; investigations of alosterone. Dr. A. Little at St. Michael's Hospital—problems in carbohydrate and lipid metabolism. Dr. J. Ruse with Dr. C. Abbott—the study of plasma non-protein-bound cortisol during pregnancy. Dr. R. H. Sheppard with Dr. P. Co-Te at Toronto Western Hospital—a study of patients with a solitary thyroid nodule; with Dr. E. Meema: skin thickness estimated radiologically in endocrine disease. Dr. D. L. Schatz at Toronto Western Hospital—calcium infusion test in untreated myxedema, rapid intravenous glucose tolerance test; study of tendon jerks in thyroid disease. Dr. Joan Vale at Women's College Hospital—anorexic agents in obese diabetics; effect of estrogen on thyroid secretion rates. Dr. R. Volpe at Toronto General Hospital with Dr. M. W. Johnston and Dr. C. Ezrin and Mr. Vas Row—study of long acting thyroid stimulator (in collaboration with the Department of Pharmacology); study of iodinated compounds secreted by the thyroid gland under various conditions.

Gastroenterology

Dr. J. R. Bingham at Toronto Western Hospital supported by the Elsie Watt Research Fund—study of the control of acidity in the duodenal cap in normals and patients with peptic ulcer. Dr. J. M. Finlay at Toronto General Hospital—study of malabsorption syndrome, calcium absorption and diabetic enteropathy. Dr. C. Hetenyi at Women's College Hospital—intravenous test for Vitamin B deficiency; pancreatic function tests in health and disease. Dr. E. J. Prokipchuk at St. Michael's Hospital—studies of calcium and magnesium absorption; effects of medium chain triglycerides in protein-losing enteropathy; effects of an antibiotic resistant bacillus in diarrhoea following antibiotic therapy. Dr. J. C. Sinclair at Toronto General Hospital (in collaboration with the Department of Bacteriology)—studies of the virology of acute hepatitis; participation in joint study with Professor Deinhardt of Chicago and Professor Bearcroft in Lagos, Nigeria.

Geriatrics

Dr. H. Meindok at Toronto Western Hospital—serum protein levels in elderly persons, thyroid function tests in the elderly.

Haematology and Neoplastic Diseases

Dr. Ruth Alison at Princess Margaret Hospital—comparison of two programs of treatment in Hodgkin's disease and lymphocytic leukemia or lymphosarcoma. Dr. C. J. Bardawill at St. Michael's Hospital—study of 17-Ketosteroid fractions in the urine of patients with leukemia and hormone dependent tumours; enzyme estimations in serum, urine and leukocytes in neoplastic and renal disorders. Dr. D. E. Bergsagel

at Princess Margaret Hospital—studies of myeloma proteins, the urinary excretion of alkylating agents, comparison of various dosage schedules of methotrexate; estimation of marrow stem cells in patients with chronic granulocytic leukemia with Dr. E. A. McCulloch. Dr. K. R. Butler at St. Michael's Hospital—treatment of Hodgkin's disease with Vinblastine; studies of lymphocytes with immuno-electrophoresis.

Dr. D. H. Cowan at Toronto General Hospital—chemotherapy of malignant disease; lymphocyte proliferation in vitro as an index of histocompatibility and immune response to tumour. Dr. J. H. Crookston at Toronto General Hospital—study of Myeloproliferative thrombocythaemia with Dr. M. A. Hooey; in vivo and in vitro assays of AHG activity, with Dr. R. Herst; investigation of auto-antibodies with anti-I and anti-i specificity (with Mrs. M. Crookston); investigation of new abnormal haemoglobins; chromosomal aberrations in patients with myeloproliferative disorders; investigations of haemolytic anemia and platelet economy. Dr. R. Hasselback at Princess Margaret Hospital—comparative chemotherapy studies in lymphomas and bronchogenic carcinomas. Dr. Dorothy Ley at Toronto Western Hospital—iron metabolism and serum protein alterations in malignant disease; comparative study of chemotherapeutic agents in cancer; tissue culture and chromosome studies (with Dr. P. Richardson, Dr. O. C. Oral and Dr. S. Sekiguchi). Dr. J. W. Meakin at Princess Margaret Hospital—immunotherapy of patients with cancer of the cervix with Dr. B. Cinader; cancer chemotherapy; iron metabolism in malignant disease. Dr. E. A. McCulloch at Toronto General Hospital (with Department of Medical Biophysics)—factors controlling differentiation in proliferation in the haemopoietic system; regulation of granulopoiesis and erythropoiesis; study of the cellular basis of immune-haemolysin production. Dr. J. G. Watt at Toronto Western Hospital—neurological complications of polycythemia rubra vera.

Metabolism and Diabetes

Dr. A. Bruce-Robertson at Princess Margaret Hospital—effect of radiation therapy on protein metabolism; study of haptoglobins in patients with malignant disease; characterization of serum proteins in various disorders. Dr. W. R. Campbell at Toronto General Hospital—determination of calcium and magnesium levels in body fluids and excreta. Dr. J. R. Evans at Toronto General Hospital with Dr. S. Sanbar—interrelations of glucose and fatty acid metabolism in isolated tissues and intact animals; turnover of neutral lipids and phospholipids in heart muscle and other tissues; use of radio-iodinated fatty acids in surface scanning of tumours and myocardial infarcts. Dr. N. Forbath at Toronto General Hospital (with Dr. G. Hetenyi, Department of Physiology)—dynamics of glucose metabolism in various types of diabetes. Dr. Joan Harrison at Toronto General Hospital (with Dr. J. M. Finlay and Professor K. G. McNeill, Department of Physics)—studies with radioactive calcium, using a whole body counter; investigation of osteoporosis, osteomalacia and malabsorption syndrome.

Dr. J. A. Little at St. Michael's Hospital—new method for estimating serum triglycerides; lipids and lipoproteins in coronary heart disease; effects of diet on serum lipids; lipids and blood coagulation. Dr. A. Rapoport at Toronto Western Hospital—excretion of acid by patients with different types of kidney stone; improved methods for creatinine determination and creatinine clearance tests; metabolic effects of prolonged starvation in obese patients. Dr. P. G. Walfish at New Mount Sinai Hospital—carbohydrate and lipid interrelationships in obesity and diabetes; response of adipose tissue to various hormones; methods for estimation of lean body mass. Dr. E. R. Yendt at Toronto General Hospital with Dr. Raymond Gagne, Dr. N. M. Wolfish—investigation of patients with recurrent renal calculi; effect of thiazides on calcium metabolism; calcium and magnesium concentrations in saliva and sweat; investigation of renal tubular defects, hyperparathyroidism magnesium metabolism, urinary hydroxyproline excretion.

Neurology

Dr. H. J. M. Barnett at Toronto General Hospital with Dr. A. T. Jousse, Dr. M. Hill, Dr. W. Loughheed, Dr. R. G. Elgie, Dr. B. Rewcastle—progressive Myelopathy following Traumatic Paraplegia, Middle cerebral artery occlusions; carotid artery occlusion, Unverricht's myoclonic dementia, traumatic neck injuries. Dr. D. Crapper at Toronto General Hospital with Dr. D. Wood—estimation of cerebral blood flow with radioactive tracers. Dr. J. Humphrey at Toronto General Hospital—histochemistry of muscle enzymes; study of acute facial palsies; nerve conduction velocity in relation to corticosteroid therapy; studies in myasthenia gravis. Dr. O. Kofman at New Mount Sinai Hospital—research on cleidocranial dysostosis; intermittent hydrocephalus with cysticercosis; ipsilateral seizures. Dr. J. T. Marotta at St. Michael's Hospital—value of tegretol in trigeminal neuralgia. Dr. W. J. McIlroy at Toronto General Hospital—clinical review of Multiple Sclerosis. Dr. R. S. McPhedran (Wellesley Hospital)—electronmicroscope studies of polymyositis. Dr. J. C. Richardson at Toronto General Hospital with Dr. J. Steele—study of progressive supranuclear palsy. Dr. J. R. Wherrett—study of glycolipids in metachromatic leukodystrophy, Hurler's disease and other types of cerebral lipidosis.

Psychiatry (General Hospitals)

Dr. E. F. W. Baker at Toronto Western Hospital—use of lysergic acid diethylamide in Psychotherapy. Dr. D. Forman at Toronto General Hospital—study of psychiatric emergencies and suicidal attempts. Dr. R. Pos at Toronto General Hospital—investigation of psychiatric effects of sensory deprivation; incidence of hallucinations in patients with paraplegia; applications of lysergic acid diethylamide. Dr. A. J. Preston at Toronto Western Hospital—study of the psychiatric therapeutic community within a general hospital. Dr. L. P. Solursh at Toronto Western Hospital—use of LSD-25 in the treatment of alcoholism and in psychotherapy. Dr. J. Allan Walters at Toronto General Hospital—psychogenic regional pain syndrome.

Renal Disorders

Dr. W. T. W. Clarke at Toronto General Hospital—dialysis therapy of chronic renal insufficiency. Dr. F. M. Hill at Women's College Hospital with Dr. Sylvia Roa—bacteriuria in pregnancy and in healthy student nurses. Dr. A. Rapoport at Toronto Western Hospital with Dr. S. M. Zweig—investigations of patients with renal calculi, and renal function tests. Dr. G. Smith at Wellesley Hospital—clinical pathologic correlations of renal biopsy. Dr. E. R. Yendt—corticosteroid therapy in nephrosis and certain types of glomerulo nephritis; renal tubular defects.

Respiratory Diseases

Dr. J. F. Paterson at Toronto Western Hospital with Dr. R. C. Wolfe and G. Aguzzi—prevalance of obstructive lung disease in very old people. Dr. C. R. Woolf at Toronto General Hospital—rehabilitation of patients with advanced chronic chest disease; carotid body removal in the treatment of asthma; effects of respiratory stimulants; long term survey of the effect of cigarette smoking; development of "artificial lung."

Rheumatic Disorders

Dr. J. S. Crawford at Toronto Western Hospital—osteomyelitis of the Spine, care of Hemiplegics. Dr. D. Gordon at Toronto General Hospital and Sunnybrook with Dr. M. A. Ogryzlo—serum protein abnormalities in rheumatic diseases. Dr. J. Houpt at New Mount Sinai Hospital with Dr. M. A. Ogryzlo and Dr. H. Weber—investigation of Allopurinol in disorders of uric acid metabolism; tryptophane metabolism. Dr. M. A. Ogryzlo at Toronto General Hospital and Sunnybrook—investigations of serum protein changes, anti-nuclear factors and anti-cellular factors, LE factors, tryptophane metabolism in rheumatoid arthritis, pulmonary fibrosis in rheumatoid arthritis, uric acid metabolism, investigation of dimethyl sulfoxide, Aleutian disease of mink. Dr. H. A. Smythe at Toronto General Hospital with Dr. Hugh Little

—pulmonary function study in rheumatoid arthritis; renal transport of urates, in relation to glucose and amino acid transport; studies of sulphinpyrazone on platelet metabolism (with Dr. Fraser Mustard and Dr. John Blakely).

PUBLICATIONS

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- ALDRIDGE, H. E. and WIGLE, E. D. "Partial Anomalous Pulmonary Venous Drainage with Intact Interatrial Septum Associated with Congenital Mitral Stenosis" (*Circulation*, vol. 31, 1965, pp. 579-84).
- ARNOTT, J. H. and LITTLE, J. A. "Sulfated Insulin in Mild, Moderate, Brittle and Insulin-resistant Diabetes Mellitus" (*Canadian Medical Association Journal*, vol. 92, 1965, p. 346) (Abstract).
- ARNOTT, J. H., LITTLE, J. A., COLAPINTO, V. and O'SULLIVAN, P. M. "Comparison of Peritoneal Dialysis and Haemodialysis in the Treatment of a Patient with Acute Renal Failure due to Glomerulonephritis" (*Canadian Medical Association Journal*, vol. 91, no. 22, Nov. 28, 1964, p. 1175).
- BAKER, E. F. W. "The Use of Lysergic Acid Diethylamide in Psychotherapy" (*Canadian Medical Association Journal*, vol. 91, Dec. 5, 1964, pp. 1200-2).
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- BRODER, I. *et al.* "The Action of Soluble Antigen-Antibody Complexes in Perfused Guinea-Pig Lung" (*Immunology*, vol. 8, 1965, pp. 300-18).
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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor D. E. Cannell

In the course of the past year some deficiencies in undergraduate experience have been remedied. In the last quarter of the session, students had experience at the Princess Margaret Hospital with patients suffering from carcinoma of the cervix. The opportunity will be extended to include the whole class in 1965-1966.

At the Women's College and Wellesley Hospitals, undergraduates have had opportunities to conduct vaginal deliveries in a significant proportion of patients.

The experience of the final year at the Wellesley Hospital with a more practical and extensive clinical clerkship has been gratifying.

There continues to be an adequate number of patients available for study by undergraduate and postgraduate students. There has been no increase of such patients. It is hoped that the introduction of a wider measure of health insurance will not decrease the numbers. Little attention would seem to have been given to this problem of medical education by politicians—medical or otherwise.

The Department is pleased to report the success of Doctors A. J. Bush, A. R. Cochen, W. H. Harris, J. E. Kapsos, N. D. Kerr, J. E. Milligan, T. N. Naprawa, F. R. Papsin, and W. D. Thomas who obtained their Fellowship in the Royal College of Physicians and Surgeons of Canada.

Dr. C. S. Russell returned in December, 1964 from a year's study abroad, to join the staff of the Toronto Western Hospital. His interests are those related to clinical gynaecological endocrinology.

Dr. F. R. Papsin is spending a year abroad on a Cancer Fellowship to study gynaecological cancer in all its aspects. The first six months have been spent in Europe and Great Britain, the final six months will be spent in the United States. On his return, he will be attached to the Toronto Western Hospital.

Short refresher courses were held for general practitioners in November and January. In March the first short refresher course for gynaecologists was presented. The response and interest of the group was gratifying. It was apparent that this filled an obvious gap in our postgraduate activities. The widespread interest in and need for this was exemplified by the geographic registration which extended across Canada, with some representation from the United States. It will be the policy of our Curriculum Committee to continue and possibly enlarge this type of programme.

The Department was honoured by visitors from abroad including Sir John Peel of London, England who was the guest speaker at the Annual Meeting of the Royal College of Physicians and Surgeons of Canada held in Toronto in January, 1965; Mr. John Blaikley, Guy's Hospital, London, England; Professor Clyde L. Randall, Buffalo, New York; Professor J. McClure Browne, London, England; Professor Bayard Carter, Duke University, Durham, North Carolina; and Dr. and Mrs. Shinichi Yagi of Tokyo, Japan.

The Annual Meeting of District V of the American College of Obstetricians and Gynaecologists was held at the Royal York Hotel from October 8th to 10th, 1964. The chairman of the Department was responsible for the local arrangements. The local committee was most efficient and great credit for the success of the meeting is due Doctors W. G. Francis, L. J. Harris, and D. J. Shaul for the discharge of their responsibilities.

The Annual Meeting of the Royal College of Physicians and Surgeons of Canada was held in Toronto in January. This was an extremely satisfactory meeting. Members of the Department took part in the programme.

Many members of the Department have participated in scientific meetings and panel discussions in Canada and the United States.

The Department has continued to receive support for research from the Department of National Health and Welfare, the Medical Research Council, the Dominion Stores, and S. C. Johnson & Son, Ltd. We wish to acknowledge our gratitude for their generous contributions.

The Department records with pride the appointment of Dr. James Low to the Chair of Obstetrics and Gynaecology at Queen's University, Kingston. Dr. Low's achievements as an investigator, postgraduate teacher, and consultant will be sorely missed in Toronto. We wish him every success in his new post.

Dr. John R. McArthur died after a prolonged and painful illness on November 14, 1964. Dr. McArthur's association with the Department began in 1935. He was a most energetic and distinguished gynaecologist with a great store of clinical wisdom

and an appreciation of the necessity of research within the Department. He was a most loyal and sincere colleague who contributed a great deal to the training and assessment of postgraduate students. His final contribution to this University and Department was the establishment of the "John and Amy McArthur Fund for Research in Obstetrics and Gynaecology." It is anticipated that a Chair in Obstetrical and Gynaecological Research will be established in his and Mrs. McArthur's name in the near future. His untimely death leaves a large void in Obstetrics and Gynaecology in this centre. He will be sorely missed by his friends, colleagues, and patients.

The Department records with regret the retirement of two of our senior colleagues at the Toronto General Hospital, Professor Nelson Henderson and Associate Professor Leslie Watt. Professor Henderson joined the Department in 1928. For many years he was in charge of the Gynaecological Pathological service in the Banting Institute. He made notable contributions in this field. Over the years he has steadily increased his interests in clinical Obstetrics and Gynaecology. He has been a superb teacher of undergraduate and postgraduate students, in both precept and practice. His achievements have been recognized far beyond the confines of the University, both within Canada and abroad. His services to the Department and the University have been great and he will be sorely missed. He will now devote himself exclusively to his private practice in Gynaecology. Dr. Watt was trained at the Toronto General Hospital. After a short period of practice in Brantford he returned to Toronto and joined the Department in 1931. He took an interest in all aspects of Departmental work. In recent years, with the co-operation of Doctors Greenwood and Bigelow, he studied the course and management of pregnant patients suffering from mitral stenosis. As a result of this study, mitral commissurotomy became more widely used during pregnancy, with beneficial results to mother and baby. In the past two years, he has been Chairman of the Perinatal Mortality Committee which has been most useful in the teaching programme. His conscientious and capable contributions to the Department will continue in his post as a Graduate Lecturer. He will be able to devote a greater part of his time to private practice before he assumes the post of Obstetrician and Gynaecologist-in-Chief at the new North York Hospital.

This fifteenth submission for the Dean's report will be the last for the present head of the Department. Dr. William Paul, a graduate of this school and at present Professor and head of the Department of Obstetrics and Gynaecology at the University of Alberta, will take over on July 1, 1965. It is fitting, therefore, to acknowledge the assistance, support and co-operation that I have received from all sources since my appointment, without which whatever progress that has been made would have been impossible.

Under Dr. Paul's direction, there is no doubt that the Department will continue to advance and prosper.

RESEARCH

Members of the staff have undertaken the following research work.

Doctor T. A. Doran has completed his study of malignant cells in peripheral blood in patients with gynaecological malignancy (mainly cancer of the endometrium). He is continuing a combined study with the Department of Laboratories of the Toronto General Hospital of patients with Rh sensitization. An Rh sensitization clinic has been established and intra-uterine transfusions have been carried out. Arrangements have also been made to investigate a group of asymptomatic post-menopausal women with intra-uterine cytology as a screening procedure in the coming year.

Dr. J. A. Low has continued his studies in regard to the metabolic assessment of the infant at delivery and maternal-foetal relationships. The assessment of the

significance of asymptomatic bacteriuria in the obstetric patient is in progress. Problems of urinary incontinence and bladder dysfunction continue to be reviewed in the bladder function clinic and methods of assessment of bladder function and urethral sphincter function are under study.

Dr. J. L. Harkins is undertaking a follow-up study on cases of mitral commissurotomy in pregnancy. Pilot studies are also under way on Metaspas injectable in labour.

Dr. J. W. Millson has carried out research connected with the problem of Rh iso-immunization.

Dr. T. G. Ryley has continued his study of tissue culture and chromosome analysis of early abortions at the Wellesley Hospital. Chromosome analysis has been performed on patients with intersex conditions, primary amenorrhea, congenital anomalies, suspicious Mongolism, etc. These were carried out by means of peripheral blood leukocyte culture. One case of XY/XO Mosaicism was discovered and further investigation is in progress.

Dr. C. P. Vernon has continued his progestational steroid study in relation to endometrical cancer. There are now fifty-six patients included in the study. This year the formation of a chemotherapy unit at the Toronto General Hospital in association with the Departments of Medicine and Surgery has been accomplished. This will be a team study in the use of chemotherapy in metastatic cancer in general. From a gynaecological aspect the investigation will be concerned with carcinoma of the ovaries and the assessment of various alkylating agents and antimetabolites in achieving tumour remission. A review of patients with carcinoma of the cervix who were surgically treated during the past fifteen years has been undertaken in order to evaluate this method of treatment at the Toronto General Hospital.

In the Steroid Laboratory, Drs. S. L. Cohen and R. Wilson have developed an entirely new method for the rapid and accurate determination of oestrogens excreted in pregnancy urine, and this method has been adopted as the routine assay procedure. Drs. Cohen and Wilson are continuing their studies on the nature of the steroid conjugate excreted in pregnancy urine and are investigating various factors which influence the differential hydrolysis of these complex molecules.

The perfusion apparatus used in the study of the foetal adrenal cortex has been completed and is functioning well. One of the components of this apparatus is a completely new type of blood oxygenator developed in co-operation with the Department of Biomedical Electronics. The study of the foetal adrenal cortex is continuing in co-operation with other laboratories in Canada and Europe.

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OPHTHALMOLOGY

Under the direction of Professor Clement McCulloch

The Department has extended and broadened the content of the material taught to undergraduate students. Teaching in the third and fourth medical years continues to be aimed at an understanding of the basic concepts in the major ophthalmic diseases and towards an appreciation of those parts of ophthalmology that will be useful in general practice.

The three-year graduate programme has been further developed. Seventeen men are now enrolled. The first year is devoted to study and work in the basic sciences related to ophthalmology. The students are supported from sources outside the teaching hospitals. Dr. J. R. Miller of Calgary, Alberta, and Dr. J. E. Graham of Toronto were Canadian National Institute for the Blind Fellows. Dr. J. R. Elder was a Fellow supported by the Defence Research Board of Canada. Dr. D. H. Dickson was a Fellow under a Provincial Public Health Grant. In addition to these Fellows, Professor Y. Dayal of New Delhi was a Colombo Plan Fellow in the Department for nine months. Dr. D. B. O'Brien was on loan from Dalhousie University, studying ocular pathology under Dr. W. S. Hunter of the Department.

The second and third years of the graduate programme are devoted to progressive clinical training in the five University teaching hospitals. Drs. W. G. Rombough, H. J. McCartney, J. J. Kazdan, N. A. Wine, B. St. L. Liddy, and H. L. R. Wiebe completed the course. Besides the ten men taking these two years of the regular course, Dr. F. W. R. Seward has been taking his first year of ophthalmic training at the Hospital for Sick Children, Dr. H. J. McCartney has been completing his third year of training at the Toronto General Hospital, and Dr. J. K. Warnica has been undertaking his first year at the Hospital for Sick Children and the Toronto General Hospital, preparatory to his final two years of study at Sunnybrook Hospital. The Department is now in a position to offer five men each year a progressive programme starting with a year's study as a Fellow followed by two further years of clinical training.

The Department notes with pleasure that Drs. L. D. J. Chisholm, D. J. Morin, and W. S. Hunter successfully passed the Fellowship examinations of the Royal College of Physicians and Surgeons of Canada, modified for ophthalmology. Drs. J. F. Morgan, D. M. Dorsey, and G. M. Cobb received Certificates in Ophthalmology from the Royal College.

Dr. D. J. Morin is on a McLaughlin Fellowship studying special aspects of glaucoma with Dr. R. N. Shaffer in San Francisco. Dr. L. D. J. Chisholm is studying in Boston with the help of a Fellowship from the Retinal Foundation. Dr. J. J. Kazdan has received a Fellowship from the American Academy of Ophthalmology and Otolaryngology to study external diseases with Dr. Phillips Thygeson at the Proctor Laboratories in San Francisco.

The Fifth Annual Meeting of the University of Toronto Eye Alumni was held on February 26, 1965. The five senior residents gave papers competing for the Alumni Prize. This was won by Dr. Brian Liddy for his paper on "Thio-tepa in

Pterygium Surgery." Dr. Robert N. Shaffer, Professor of Ophthalmology at the University of California Medical School, was the Walter W. Wright Lecturer and spoke on changing trends in the treatment of glaucoma.

The Alumni have held several other meetings during the year, have taken an interest in certain public health aspects of ophthalmology in Ontario, and have generously supported the Department through the A. J. Elliot Travel Fund. The Department is fortunate to have an active and provocative alumni. The Department has circulated to the alumni weekly clinical notes from ward rounds, with other clinical or scientific information of value, and feels that the excellent response to this publication reflects the continuing interest of the neighbouring ophthalmologists.

The Annual Eye Surgery Clinical Meeting was held April 7, 8 and 9. The two guests of honour were Mr. W. S. Foulds, Professor of Ophthalmology at the University of Glasgow, Scotland, and Dr. Lester T. Jones of the Departments of Ophthalmology and Otolaryngology at the University of Oregon. Two notable points in Mr. Fould's presentation were a description of the disruption of retinal function in the presence of retinal detachment and a discussion of the pathological changes in certain dysproteinaemias. Dr. Jones described in detail defects of tearing and special types of surgery of the lacrimal system. The staff contributed a wide range of topics in the areas of medical and surgical ophthalmology and ophthalmic pathology. They also put on operating room demonstrations in all the teaching hospitals.

The Annual Research Meeting of the Department was held on May 1. Dr. George Wald of Harvard University was the guest of honour. He spoke on the molecular basis of visual function and the mechanism of human colour vision. The four Fellows of the Department gave papers representing their studies of the past year. Dr. J. R. Miller was awarded the John Gaby Prize for his study of "Sodium Potassium ATP-ase in Cornea." Of particular interest this year was the presence of Dr. Elizabeth Olmstead from Buffalo, Dr. S. Zigman of Rochester, and Dr. Reimer Wolter of Ann Arbor, Michigan, all of whom presented papers. The fourteen papers given by the Department on a number of subjects indicate the varied interests of the staff. Once again, we would like to thank Mr. H. G. Stapells who has supported the basic work of the Department and has made possible many of our research projects. The Annual Research Meeting has become internationally significant and is reported in the ophthalmic journals.

The programme of regular and special clinics in the teaching hospitals has continued to grow. The special clinics are developing into important foci of referral for the neighbouring ophthalmologists. It is particularly pleasing to note the start of an orthoptic clinic at the Hospital for Sick Children. Miss Linda Lewis, who recently passed the American Board of Orthoptics examinations, is in charge of the clinic under the direction of Dr. J. S. Crawford. Minor Orthoptic clinics are held at the Toronto General Hospital and Toronto Western Hospital and, for the first time, this service is widely available in Toronto. This work is being extended by the initiating of low vision clinics. Accompanying this development, a corresponding teaching program for the Eye Residents has been started. During the year special studies of visual fields and further tonometry tests have been added to the services previously offered by the Department. At the Toronto General Hospital, Mrs. Diane Adshead is doing special glaucoma studies under the direction of Dr. J. S. Speakman. Dr. W. S. Hunter has increased the services of the Eye Pathology Laboratory.

It should be mentioned that the work of the Eye Bank of Canada, Ontario Division, is done by the Department under the direction of Drs. G. A. Thompson and P. K. Basu. This has been a successful and growing enterprise, is now an essential service for ophthalmologists in the Province, and shortly will have to receive service support.

Only a few of the staff's outside visits to various centres and attendance at

conferences can be mentioned. Dr. W. S. Hunter presented a paper at the Canadian Ophthalmological Society meeting in Vancouver. Dr. C. B. Mortimer addressed the Pan American Ophthalmological Society in Montreal and the Canadian Ophthalmological Society in Vancouver. Dr. Michael Shea gave a paper at the Canadian Ophthalmological Society meeting, attended the International Corneal Congress in Washington, and is the Canadian representative at the International Retinal Congress at Baylor University, Texas. Dr. D'Arcy Macdonald gave a paper at a meeting in Montreal of the International Association for the Prevention of Blindness. Dr. M. Shusterman visited the Will's Eye Hospital in Philadelphia and other laboratories, studying retinal detachment. Dr. J. S. Speakman presented a paper on congenital corneal opacities at the Pan American Association meeting in Montreal, attended the second Glaucoma Conference in Ottawa, and presented a paper to the Canadian Ophthalmological Society. Dr. J. C. Hill attended a symposium on plastics and surgical implants at Indianapolis. He was co-ordinator of a exhibit at the Pan American Association of Ophthalmology meeting on the treatment of advancing enophthalmos with ocular prostheses, in collaboration with Stanley Brazier, Department of Rehabilitation Medicine, Cecil F. Webb of the Artificial Eye Centre, and Roy Wainman, Hospital for Sick Children. This exhibit placed second in competition at the meeting. Dr. Clement McCulloch participated in a symposium on glaucoma at the Pan American Association meeting in Montreal, attended the Second Glaucoma Conference in Ottawa and a meeting of the East Central Section for Research in Ophthalmology in Detroit. Dr. P. K. Basu presented three papers at the East Central Section with Drs. T. Yamashita, T. M. Sibay, and I. O. Drysdale. With Dr. Bernard Zucker, he attended the second Boston Conference on the Cornea. With Mrs. I. Fielding, he presented a paper on corneal grafts at the Canadian Ophthalmological Society Meeting in Vancouver. Dr. Y. Matuk attended the National meeting of the Association for Research in Ophthalmology in Minneapolis and a symposium on the Crystalline Lens in Minneapolis, following the meeting.

Members of the Department have held positions in national and international ophthalmology during the year. Dr. R. G. C. Kelly was President of the VII Pan American Congress of Ophthalmology and is Secretary of the Canadian Ophthalmological Society. Dr. J. C. Hill was chairman of a Symposium on Recent Advances in Surgery of the Lids at the Pan American Congress in Montreal. Dr. J. S. Crawford is a member of the Council of the Canadian Ophthalmological Society and Chairman of the Visual Panel of the Defence Research Board. Dr. R. K. MacDonald is chairman of the Academy of Medicine, Section of Ophthalmology. Dr. J. S. Speakman was appointed to the Advisory Committee on Ophthalmic Research of the Department of National Health and Welfare. Dr. D'Arcy Macdonald is on the Advisory Board of the Contact Lens Committee of the Canadian Ophthalmological Society. Dr. G. A. Thompson is chairman of the Eye Bank Committee of the Canadian Ophthalmological Society. Dr. W. S. Hunter is the Canadian representative of the Eye Pathology Alumni of the Armed Forces Institute of Pathology, Washington, D.C. Dr. P. K. Basu was awarded a medical research associateship by the Medical Research Council of Canada. Dr. Clement McCulloch is associate editor of the *Transactions* of the American Ophthalmological Society, which is published in Toronto.

The Department was pleased to have several visitors this year including Professor Sidney Lerman of Rochester, Mr. J. S. Crews on a travelling Fellowship from Birmingham, England, and Dr. T. Yamashita who contributed much to our work in the field of electron microscopy.

The Department would like to express appreciation to the B'nai B'rith for their support of Mrs. N. Sarkar in her work on special cytology studies. The Canadian National Institute for the Blind and the E. A. Baker Foundation have supported two graduate students and also Dr. Y. Matuk and Dr. Bernard Zucker. The Department also received valuable time-lapse equipment from the J. P. Bickell Foundation. The

Leaside Rotary Club purchased a deep freeze for the use of the Eye Bank. The Atkinson Foundation has continued to support the special contact lens clinic at the Toronto Western Hospital.

The Department is happy to welcome Dr. Bernard Zucker, who returned to Toronto in October, 1964, following a year of corneal research at the Retina Foundation in Boston.

Of special interest this year was the second Glaucoma Conference in Ottawa, March 22 and 23. On the second day of the Conference, the general programme of the Public Health Department in the prevention of blindness was discussed. It was hoped that a definite programme in this field can be developed in Canada and the Department in Toronto will be happy to be of assistance in such a programme.

The Head of the Department would like to record his appreciation of the efforts of all of the academic staff. A co-operative programme supported by all five teaching hospitals has been the foundation of the Department's strength. Also, we thank the technical and secretarial staff who by their support have made much of the work possible.

RESEARCH

Under the National Health Grant "Corneal Opacities and their Treatment" Dr. P. K. Basu is studying the problems of corneal opacifications and treatment by corneal grafting. In this work he has been assisted by Mrs. I. Fielding, Mrs. A. Wolf, and Mr. F. Carré. A comprehensive study on ocular cytology is continuing with the assistance of Dr. P. Sarkar of the Department of Botany. With Mrs. N. Sarkar, analysis of the chromosomes of patients suffering from hereditary eye diseases is being carried on. With Mrs. I. Fielding and Mr. Carré, the behaviour of corneal and other ocular cells in vitro is being studied. This includes fluorescence microscopical techniques to follow the immunology of corneal graft reaction. With Drs. C. H. Tator and T. P. Morley and Mrs. M. Preissig of the Departments of Neuropathology and Neurosurgery, the immunity of the anterior chamber of the guinea pig's eye to human brain tumours is being assessed. With Drs. T. M. Sibay and T. Yamashita, the ocular changes in hereditary blind Syrian hamsters is being studied. With Dr. I. O. Drysdale work has been completed on the effects of corneal grafting on the anaesthetic cornea. With the assistance of Dr. L. Narain, a Colombo Plan Fellow from India, and Dr. D. G. Baker, formerly of the Banting and Best Department of Medical Research, studies have been completed on the effect of radiation of donor material on corneal graft reaction.

Mrs. A. Wolf is continuing her work as Executive Secretary for the Eye Bank of Canada (Ontario Division). Since 1956, 1,800 eyes have been donated to the Eye Bank, 800 of these having been used for corneal transplantation. Total number of people who have pledged their eyes by signing donor cards is now 23,000. This is a joint effort with the Canadian National Institute for the Blind. The Corneal Research Clinic, supported by the Corneal grant, continues to operate twice monthly at the Toronto General Hospital under the direction of Dr. G. A. Thompson, Medical Director of the Eye Bank of Canada, Ontario Division.

Under a Medical Research Council grant, Dr. H. J. McCartney, with co-operation from Dr. A. G. Gornall of the Department of Pathological Chemistry, has completed an investigation on intraocular penetration of steroids using autoradiographic techniques.

Under another Medical Research Council grant, Dr. Y. Matuk and Miss D. K. Holt are studying the protein metabolism of the cornea. Dr. Y. Matuk and his group are working on the incorporation of radioactive proline into corneal proteins. In co-operation with Dr. J. R. Miller, he is studying sodium-potassium-activated adenosine triphosphatase (Na-K-ATPase) in the bovine cornea.

Dr. B. Zucker, who has recently joined the Department as a Research Fellow, is investigating the cytology of tear fluid and the effect of injury on the cornea.

With the help of a National Health Grant entitled "Prevention of Blindness from Glaucoma," Dr. J. S. Speakman has carried forward several projects to elucidate the background of glaucoma. With the assistance of Dr. T. Yamashita, he has studied lens exfoliation. In collaboration with Dr. J. S. Crawford he has analysed cases of congenital corneal opacities in infants. Dr. R. K. MacDonald is working under this grant and, with Dr. J. E. Graham and Mr. N. Matuk, is studying vascular factors as a cause of reduced scleral rigidity in filtering eyes. Dr. MacDonald, with assistance from Miss D. Kisielius, is developing silicone setons and stainless steel preplaced cataract sutures.

With assistance from the glaucoma grant, the Glaucoma Clinic continues to operate in the Toronto General Hospital under the direction of Dr. Speakman. Extensive studies of patients are undertaken, including special tonography, tonometry, and field testing. Miss T. Fredette and Mrs. D. Adshead have aided in the work.

Under another National Health Grant entitled "Clinical Investigation of Idiopathic Retinal Detachment," Dr. M. Shea and Dr. R. L. Alexander have carried out a field study of Wagener's vitreo-retinal disease and have completed a project on malignant melanoma of the eye. Dr. M. Shea and Dr. D. H. Dickson have been investigating the application of thermoelectric cryotherapy in retinal detachment. Dr. C. B. Mortimer is continuing with his work in photocoagulation and cryosurgery. With Dr. Dickson, he is assessing the effect of freezing on the ocular blood vessels.

With the aid of a National Health Grant entitled "Studies on the Pathology, Prevention and Treatment of Diabetic Retinopathy," Dr. H. R. Hausler, with the assistance of Dr. T. M. Sibay, Miss B. Stachowska, and Miss M. Krusell, has continued analysis of the ocular complications of diabetes. A weekly special clinic has been conducted at the Toronto Western Hospital, where a double blind study concerning the effect of lipotropic agents and bioflavonoids in the treatment of diabetic retinopathy is completing its first year. In this programme, Dr. J. R. Elder has been participating as a research fellow. Dr. Hausler and his associates are continuing to investigate the pathology of diabetic retinopathy in man and laboratory animals. For this purpose special techniques such as silver salt injection, autolysis and trypsin digestion have been developed. Miss Stachowska has succeeded in establishing a Chinese hamster colony which is breeding 30 per cent spontaneous diabetic animals. This was achieved by inbreeding; regular genetic advice was obtained from Dr. L. Butler of the Department of Zoology. Retinal vascular lesions have been countered in these animals and Drs. Hausler and Sibay have been investigating the metabolic changes which lead to a breakdown of the normal anatomy. Detailed pathological studies involving digestions preparations and electronmicroscopy are under way.

Under a grant from the Defence Research Board, Drs. Clement McCulloch and J. R. Elder have been assessing the blinding effects of sudden flashes of light.

With the help of a grant from the Atkinson Foundation, Dr. D'Arcy Macdonald has continued his work in a special Contact lens clinic held at the Toronto Western Hospital.

In addition to the foregoing formally supported work, the staff of the Department has extended its studies in a number of fields. Dr. J. C. Hill, in collaboration with Dr. Y. Dayal, a Colombo Plan Fellow, has reviewed the surgical treatment of tumours of the eyelid. Dr. M. Shusterman is continuing his clinical research on vitreous floaters, retinal detachment in children, catgut allergy in children, and intraocular lenses for aphakia. He has produced a movie on a technique of orbital resection for the relief of progressive exophthalmos and has continued research to improve this technique. Dr. J. S. Crawford, with Dr. Dayal, is conducting research on the treatment of ptosis. Dr. L. A. Lloyd has continued her study of neuro-ophthalmological problems at the Hospital for Sick Children and the Toronto General Hospital. Dr. W. S. Hunter has made an extensive clinical and histopathological analysis of cases of retinal dysplasia and has been the point of reference for a number of pathologic studies in the Department.

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OTOLARYNGOLOGY

Under the direction of Professor P. E. Ireland

The main interest of this Department continues to be the adequate instruction of undergraduate students in the preparation for their tasks as practitioners of the medical sciences. A number of minor changes have been made in the teaching methods during the past year especially in the third medical year which is now directed by Dr. W. S. Goodman. He has been assisted by Dr. Philip E. Smith. In view of the decision to eventually increase the total enrolment in the Medical School to 250 students, there will be required a considerable amount of planning for the future. The postgraduate course has continued to function as the largest training centre in Canada in our specialty and three additional trainees were appointed for July 1, 1965.

The total concept and philosophy of undergraduate and graduate training in this medical school is under review. This involves long-term planning of total block training in individual University hospitals. In addition to this, the probable acquisition of Sunnybrook Hospital has been under consideration. This Department has been most active in preparation and presentation of future plans by frequent committee consultations and our suggestions have been forwarded to the Dean.

For two years an Ad hoc Committee has been meeting to consider the feasibility of an Institute of Speech and Hearing in the University of Toronto. Consultations have been held with the Departments of Health and Education and recommendations have been sent to the Dean for further consideration.

During the fall of 1964 a conference on the "Assessment and Treatment of the Hard of Hearing Infant and Child" was held under the auspices of this Department in Toronto. This involved the assembling of people from all parts of the world who are interested in this problem. It was financed through the generosity of Mr. and Mrs. E. C. Fox, the co-chairmen being the head of the Department and Professor Hallowell Davis of the Central Institute for the Deaf in St. Louis, Missouri. A full edited text is to be published as a supplement by the *Acta Oto-Laryngologica*, Stockholm, Sweden.

There have been many activities by members of the Department during the past year, only some of which will be mentioned. Two continuing medical education courses were given, both of which were over subscribed. For the first time, one of these was for Otolaryngology as related to General Practice. The second was a Refresher Course for certified specialists. Both of these courses are to be repeated next year.

Dr. T. D. R. Briant has returned to the staff following a year as a Fellow at the Ferens Research Institute and Middlesex Hospital in London, England, and has initiated the operation for transphenoidal hypophysectomy at the Toronto General Hospital. He has also been associated with Dr. C. Ezrin in the bio-chemical study of the pituitary gland. Dr. Philip E. Smith has been added to the Staff of St. Michael's Hospital following his return after one year on a McLaughlin Fellowship at the Royal National Ear, Nose, and Throat Institute in London, England. He has been replaced in England by a further McLaughlin Fellow, Dr. David Haldenby.

Dr. D. P. Bryce has continued to be the Chief Consultant in Otolaryngology to the Princess Margaret Hospital, assisted by Dr. T. J. Molony and Dr. C. W. Dobson. Dr. Bryce has participated in the World Cancer Workshop in New York and the Clinical Congress of the American College of Surgeons in Chicago. His presentations are now in press. Dr. T. D. R. Briant presented a paper at the American Triological Society meeting in Madison, Wisconsin on Transphenoidal Hypophysectomy. Dr. H. O. Barber presented papers on the subject of vertigo in Boston, Massachusetts, and at the Defence Research meeting in Ottawa, and was the guest of honour at a "stated meeting" of the Academy of Medicine, Toronto. Dr. B. Fearon continues as a member of Council of the American Broncho-Esophagological Association.

Professor Ireland and Dr. Walter H. Johnson attended a Conference on "Vertigo and Disorientation" of the National Aeronautical and Space Administration held in Pensacola, Florida.

The head of the Department has been invited to present a paper at the International Congress in Tokyo in October. He has a further invitation to continue to India as a guest of the Government and the Minister of Health. He has been requested to present papers at ten of the Indian medical schools and the All India Academy of Medical Sciences in New Delhi.

Professor Ireland, as head of the Department, wishes to thank all his Staff for the co-operation he has received during the past academic year. It has required many evening Committee meetings to prepare the material for future plans in both teaching and research. One must also extend gratitude to the Research Fellows, technical staff, and to our secretaries who are closely associated in all the details of administration.

RESEARCH

Dr. Walter H. Johnson has been appointed as Director of Research with the rank of Associate Professor in the Department of Otolaryngology. He has also been given a joint appointment to the Department of Physiology. He has unofficially acted as adviser and teacher in both of these departments but was employed by Defence Research Medical Laboratories. His new full-time appointment will enable him to correlate the present research problems and initiate further studies. He will have a position as Honorary Consultant to the Defence Research Council. This

should assure a continued concerted interest in the problem of vertigo and disorientation in aeronautical and space travel.

At Defence Research Medical Laboratories during the past year, animal experimentation has continued under Dr. Johnson with the able assistance of Dr. J. K. B. Smith and Professor Gosta Dohlman of Lund, Sweden. Animals have been prepared for assessment and tested under conditions of weightlessness and will be placed in orbit by NASA. Professor Dohlman has been officially assigned as Consultant to the Defence Research Council.

Professor Dohlman has continued as director of a generous research grant from the National Institutes of Health in Washington. The stated title of this investigation is "Secretion and Absorption of the Endolymph, normal and abnormal." During his investigation, however, his activities have led him to a much broader field in the assessment of labyrinthine function. This has included the mechanism of explosive labyrinthine dysfunction similar to that found in Meniere's symptom-complex. This work has been associated with the Department of Physiology of our University, the Defence Research Medical Laboratories, and the University of Chicago. Much of this investigation requires the employment of Tracer substances and a full knowledge and use of electronmicroscopic techniques. This work is being presented at the International Congress in Tokyo.

Dr. Yuichi Nito continues his research on the effect of alcohol on the peripheral and central vestibular centres. Dr. T. D. R. Briant and Dr. L. M. Smith have continued to work in Dr. J. W. Scott's laboratory in the Department of Physiology on the problem of the implantation of micro-electrodes in the vestibular nerve pathways. This project is supported by Defence Research. Dr. Briant has also been associated with Dr. C. Ezrin of the Department of Medicine in the study of physiology and pathology in the pituitary gland in advanced carcinoma of the breast, diabetic retinitis, and primary pituitary tumours.

At the Hospital for Sick Children, Dr. J. B. Whaley has continued as director of the research in the deafness of children. Dr. P. Statten with Dr. Shirley Appleby and Dr. W. Hawke are assessing deafness in children by the use of E.E.G. The pilot scheme at the Hospital for Sick Children under the support of the Atkinson Foundation is established for the early pre-school training of deaf children by the use of the high powered hearing aids. Dr. B. Fearon is conducting an investigation into the measurements and structure of the living infant trachea. At St. Michael's Hospital, Dr. Elizabeth McKee continues her investigation in the Vertigo Unit on the clinical aspects of dizziness. Dr. P. E. Smith has begun a series of transphenoidal hypophysectomies similar to those initiated by Dr. T. D. R. Briant at the Toronto General Hospital. Dr. G. A. Fee at the Toronto Western Hospital is doing an extensive clinical study of the most suitable prosthetic materials for use in Stapes replacement. This is with special regard to their effects on the higher frequencies in hearing following stapedectomy. The Vertigo Unit in the Toronto General Hospital, under the support of the John A. Hartford Foundation, continues its investigation of the coriolis phenomenon and the effect of drugs on the vestibular centres. A number of papers have been given on this work in various centres by Dr. Barber. Dr. Joseph Farkashidy has been associated in this work and is presenting a paper in Montreal in June of this year. Dr. Walter Johnson is also acting as consultant to this Unit.

Under a grant from Mr. and Mrs. E. C. Fox the research on the "Investigation of Young Infants and Assessment of Hearing in Infants and Young Children" is continuing. This is under the Department of Physiology (in the subdepartment of neurosensory diseases under Professor J. W. Scott) and Otolaryngology. It involves the use of E.E.G. equipment and computers of average transients. A survey is presently being conducted at the Hospital for Sick Children. A complete instrument for testing is being developed which includes a new type of computer. This work was presented as a part of the World Congress held in Toronto last Fall and is to be further given at the International Congress in Tokyo and the All India Academy of Medical Sciences in New Delhi, India.

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PAEDIATRICS

Under the direction of Professor A. L. Chute

A number of significant events have occurred in the past year: (a) the scientific celebration in connection with the opening of the Gerrard Street Wing; (b) the establishment of Paediatric Consultants; (c) the inclusion of the majority of rotating internes from the other teaching hospitals into a training programme in this hospital; (d) the re-organization of the Research Institute with departmental responsibility for its own research activities.

The hospital's annual reunion of internes and residents was the occasion for a three day clinical and scientific programme to celebrate the opening of the new Gerrard Street Wing of the Hospital. A most impressive programme was prepared and we were honoured by the presence of many distinguished visitors from the United Kingdom, the United States of America and Canada. Amongst them were: John Beveridge, Professor, University of South Australia; R. E. Bonham-Carter, Physician, Cardiologist, Hospital for Sick Children, London, Eng.; John Caffey, Emeritus Professor of Radiology, Columbia University, Pittsburgh; Donald B. Cheek, Head, Division of Growth, Department of Pediatrics, Johns Hopkins University, Baltimore; Bruce Chown, Director, Rh. Laboratory, Winnipeg; Robert F. Cooke, Given Fund Professor of Paediatrics, Johns Hopkins University; Geoffrey W. Dawes, Director, Nuffield Institute for Medical Research, Oxford, England; William G. Hardy, Director, Hearing and Speech Center, Johns Hopkins Hospital; H. de V. Heese, Lecturer, Dept. of Child Health, University of Cape Town; L. Stanley James, Associate Professor of Pediatrics, Columbia University, New York; P. J. Maloney, President, Canadian Paediatric Society; Donald D. Matson, Neurosurgeon-in-Chief, Childrens Hospital Medical Center, Boston.

J. F. A. P. Miller, Lecturer, Chester Beatty Research Institute, Bethesda, Maryland; Richmond S. Paine, Neurologist, Children's Hospital of the District of Columbia, Washington; G. Jackson Rees, Honorary Lecturer, Paediatric Anaesthesia, University of Liverpool, England; Richard D. Rowe, Associate Professor of Pediatrics, Johns Hopkins Hospital; Robert S. Schwab, Associate Clinical Professor of Neurology, Harvard Medical School; Sydney Segal, Associate Professor, Department of Paediatrics, University of British Columbia; Margaret G. Smith, Professor Emeritus of Pathology, St. Louis, Missouri; Robert H. Usher, Lecturer in Paediatrics, McGill University, Montreal; David J. Waterston, Surgeon, Hospital for Sick Children, London, England; Leila E. Wynter, Senior Paediatrician, Children's Hospital, Kingston, Jamaica. Also present were representatives from other divisions of the University, Honorary Consultants to the Hospital for Sick Children, and former senior members of the staff. Particular thanks are due to Dr. J. H. Ebbs, Chairman of the Programme Committee, for the excellent arrangements.

Paediatric Consultants

The establishment of "Paediatric Consultants" on July 1, 1964, marked the culmination of a three-year study leading to the formation of a teaching unit. We are greatly indebted to Mr. Parkinson and Mr. Little of Clarkson Gordon and Company for their help in organizing the financial structure and to Mr. John Clarry, of McCarthy and McCarthy, for his painstaking care in drawing up the articles of agreement for the partnership. Finally, we would like to thank the Director, Mr. J. T. Law, and the Trustees for their encouragement and financial assistance in successfully launching this project.

The imperative need to preserve and expand an adequate learning experience for residents, students, and staff compatible with expert patient care is the goal of this organization. The essential element is a team approach by students, internes, and residents with final supervision by staff physicians and consultants of all patients, both private and public. The purpose is to provide residents with participating responsibility rather than passive observation of patients on their service. The advent of universal medical insurance and thus the disappearance of the indigent or public patient, formerly the source of teaching material, has made the present organization mandatory in our opinion if satisfactory graduate clinical teaching is to continue.

While monetary concerns regarding adequate compensation loomed large in the planning stages, the more difficult problems in actual operation are the personal ones of adequate communication between the personal physician and those responsible for patient care under the team system. That there has been a minimum of friction and misunderstanding in such a major undertaking is probably the best tribute to the co-operative dedicated service rendered by the staff residents and nurses.

Rotating Internship

In the past only a limited number of posts were available to those internes in other teaching hospitals who wished to include paediatrics in their training. A recent ruling by the College of Physicians and Surgeons of Ontario, making such training mandatory has put a considerable burden on our residents' accommodation. Indeed the expanding needs for internes and residents, many of whom are married with families, strongly suggest the need for some form of subsidized apartments. These should be adjacent to or within easy walking distance of the hospital or hospitals, if a joint project were to be developed. We have been pleased with the evident keenness and interest of the rotating internes and feel that the inclusion of such training in their internship will result in better care for children in our society.

Retirements

Dr. Harold E. Edwards will be retiring from active staff in July. Dr. Edwards'

quiet manner, and his devoted service to patients and students, will always be remembered.

RESEARCH

The reorganization of the Research Institute within the Hospital for Sick Children has returned to departments the responsibility for their research programmes. A number of additions have been made in the past year to our research group. The research projects of other members are outlined below:

Allergy. Dr. C. Collins-Williams, in collaboration with Dr. Mario Moscarello, has conducted studies on the serum protein abnormalities in intractable asthma.

Cardiology. Dr. J. D. Keith and Dr. R. Fowler continued their studies on a wide variety of congenital and acquired heart lesions in children. Dr. B. S. L. Kidd studied problems of hypothermia in newborn pigs.

Endocrinology. Dr. J. D. Bailey, in collaboration with Dr. J. Martin, continued his studies on dwarfism with special emphasis on the effects of human pituitary growth hormone. Dr. R. Ehrlich studied problems of hypoglycaemia.

Genetics. Dr. T. E. Reed is continuing his studies in the possible selective aspects of blood groups. Dr. Margaret W. Thompson, in collaboration with Dr. E. G. Murphy, is studying a means of identifying carriers in Duchenne muscular dystrophy.

Haematology. Dr. P. McClure is continuing his investigations into thrombopoietic and platelet activities in the thrombocytopenic states. Dr. Marilyn Sonley and Dr. J. Darte are continuing their investigations of chemotherapeutic agents in malignant disease.

Metabolic Diseases. Dr. D. Fraser and his group continued their studies of calcium and phosphorus metabolism and kidney function. Dr. Ingeborg Radde, who recently rejoined our staff, started her investigation of magnesium metabolism and the control of parathyroid function. Dr. A. Sass-Kortsak and Dr. J. L. Weber continued their investigation of the problems of liver disease in children. In collaboration with Dr. N. Aspin and Dr. B. Sarkar, studies on the transport of copper were continued. In collaboration with Dr. S. H. Jackson, Dr. A. Sass-Kortsak has initiated a study of amino acid metabolism in liver disease and various other metabolic diseases in children. Dr. D. Crozier continued his clinical research on Fibrocystic Disease.

Problems of the Newborn. Dr. Paul Swyer and his group continued their studies of respiratory problems in the newborn.

Neurology. Dr. J. S. Prichard and his group studied the relation of calcium and phosphorus metabolism to brain damage in the newborn.

Virology. Dr. D. M. McLean and his group have confirmed that Powassan Virus is maintained in nature by a cycle involving ticks and groundhogs. Interferon has been produced following inoculation of chickens with massive doses of Powassan Virus and this may curtail further multiplication of the virus.

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PATHOLOGICAL CHEMISTRY

Under the direction of Professor J. A. Dauphinee

Undergraduate Teaching. During the session 1964-65 the 157 students of the third medical year and a number of graduate students from various departments attended the lectures and laboratory classes in General Pathological Chemistry. The nature of the teaching in this course has been fully described in previous reports and will not be elaborated on here. Although the basic programme has been similar to that of previous years it has been modified somewhat in order to include additional teaching of Immunochemistry and to permit a greater amount of seminar type teaching to small groups of 8-10 students. At these seminars the biochemical findings and abnormalities of the cases being studied and the relationships of these findings to the clinical manifestations of the particular patient are discussed, mainly by the students themselves, in a lively and completely informal way. It is felt that this type of instruction has done much to stimulate student interest in this increasingly important aspect of their medical training.

A great deal of time and thought this year has been devoted by the senior members of the Department, and particularly by Professor Gornall, to a consideration of the role that the Department could and should play in our medical faculty when the plan to carry out all the teaching of the final two years in the several teaching hospitals comes ultimately into effect. As our course for the undergraduate medical students is given during the next to final year of the medical course the setting up of this plan will mean that the teaching of our subject too will have to be done by separate groups of teachers at each of the individual hospitals. It is felt very strongly that all plans for the future of the Department must take into consideration not only undergraduate teaching but also our graduate teaching and

training programmes, our fundamental and applied research activities, and our relationship to the clinical chemistry departments in the various teaching hospitals and, as well, our plans for a considerable expansion of the staff and activities of our Department. After much discussion among ourselves and with other persons, a plan for a central department and for the setting up of separate associate departments in each of the teaching hospitals has been developed and this has been submitted to the Administration for consideration.

Graduate Teaching. Nine students have been registered in the Department with the School of Graduate Studies during 1964–65 for advanced degrees—6 for the Ph.D. and 3 for the Master of Arts degree. Two of the Ph.D. candidates successfully completed their programmes this year and were awarded their degrees during the session. The titles of the theses submitted by these two students were (1) “Hormonal Factors in Hypertension,” Daniel Ostrovsky; (2) “A Correlation of Structure, Function and Enzyme Activity in Regenerating Kidney Tubules,” Andrew DeWitt Baines. In recognition of the high quality of their work Dr. Ostrovsky was awarded the Stuart Alan Hoffman Prize in 1964 and the Reeve Prize in 1965 and Dr. Baines has just been awarded one of the Starr Medals for 1965.

Two of the M.A. candidates, Mrs. B. J. Cadeau and Miss Florence Brown, have also completed the requirements. Mrs. Cadeau’s thesis was entitled “Radioactivity of Rat Tissue after Injection of Tritiated Aldosterone” and her degree was awarded at the Fall Convocation. Miss Brown’s thesis was entitled “A Study of Urinary Proteins in Nephritis and Nephrosis with Respect to Molecular Size” and she received her degree at the recent Spring Convocation. A number of other students, working for graduate degrees in other departments, were registered with us for one of their Ph.D. minors. In addition four students in the Faculty of Medicine were registered in the Department for the B.Sc.(Med.). Two of these completed the requirements this year and received their degree at the Spring Convocation.

The graduate course in Clinical Chemistry (course no. 1005 in the Graduate School Calendar) was given again this year under the direction of Dr. C. J. Porter and Dr. D. Michener Schatz. This course was attended by 16 graduate students, 6 with M.D. degrees, 10 with Bachelor’s degrees, and also by 16 students who had had extensive experience in hospital biochemistry. Nineteen qualified applicants could not be registered because of limitations of space and equipment. The course is given in the very up-to-date Biochemistry Laboratory of the Toronto General Hospital and it is designed to equip students with the theoretical and practical knowledge necessary for one who wishes to direct a Hospital Clinical Chemistry Laboratory. The total instruction this year consisted of some 50 hours of lectures and 50 hours of laboratory exercises and demonstrations. The course deals with all aspects of theoretical and analytical chemistry as applied to clinical chemistry and also with the application of chemical studies to the investigation and diagnosis of patients. Special emphasis, too, is placed on making the students familiar with the latest developments in laboratory instrumentation—such as recording spectrophotometry, modern apparatus and techniques for blood gas analysis and acid base assessment—and with the application of automated equipment of all kinds to laboratory work, the increasing use of which has completely revolutionized hospital biochemistry in the past few years.

The great importance of immunological and immunochemical reactions as factors in human disease is becoming increasingly evident and the graduate course in Immunochemistry (course no 1006 in the Graduate School Calendar) given by Professor Cinader is designed to cover the basic fundamentals of these subjects and their clinical applications. In the course this year some 52 lectures were given by Dr. Cinader and other local authorities. In addition, 12 seminar lectures were given by distinguished investigators from elsewhere who are well known for their researches

in these fields and who have made important recent advances. These special lecturers were brought to Toronto by Dr. Cinader with help partly from a Training Grant from the National Institutes of Health, partly from funds made available by the School of Graduate Studies, and partly from other sources. The first half of this course dealt with the fundamental aspects of antigen-antibody interaction, special attention being paid to the specificity and heterogeneity of antibody. Also covered in this part were the reactivity of the normal animal, the rate of antibody formation, acquired immunological tolerance, and antibody synthesis. The second part of the course dealt with complement fixation, allergy, anaphylaxis, immunopathology, and blood group immunology.

Postgraduate Teaching. The two and a half weeks course for medical graduates on the Clinical Use of Radioactive Isotopes was given again this year under the direction of Professor William Paul shortly after the termination of the undergraduate session. Twenty-eight of the thirty possible places were taken and the course once more was very successful.

The senior members of the Department have also taken an active part in a variety of refresher courses put on by the Postgraduate Medical Division including the one on Medical Genetics and the annual advanced refresher course for Fellowship candidates and others.

Staff. It is expected that Professor Nicholson, who has been away on leave of absence for the past two and one half years in order to develop the Department of Pathology in the University of Lagos Medical School, will be returning to the Department before the opening of the new term. His return will be very welcome for in his absence we have been badly understaffed. Dr. Daniel Ostrovsky, who obtained his Ph.D. in the fall of 1964, has been appointed a lecturer in the Department for a year prior to his going to Cleveland for further post-doctoral experience, and Dr. Andrew DeWitt Baines, who also acquired his Ph.D. this year, has accepted a two year post-doctoral Fellowship with Dr. Carl W. Gottschalk, Professor of Medicine and Physiology at the University of North Carolina and also a Career Investigator of the American Heart Association. It is hoped very strongly that these two able young men will return to the Department after having had this additional post-doctoral training.

Lectures. Lectures and papers given by the staff outside the University include: "The Specificity of Immunological Tolerance" by B. CINADER, J. E. M. ST. ROSE, and M. YOSHIRMURA, at the Swiss Society of Allergy and Immunology, Locarno, Switzerland, May 1-3, 1965; "Medical Uses of Isotopes: New Trends," by WM. PAUL, at the Joint Meeting of the American Nuclear Society, Niagara-Finger Lakes Section and the Canada Nuclear Association, Toronto, May 12, 1965; "Effects of Adrenal Hormones on Blood Pressure Responses to Angiotensin, Renin, Noradrenaline, and Vasopressin" by D. OSTROVSKY and A. G. GORNALL at the 8th Annual Meeting of the Canadian Federation of Biological Societies, Ottawa, June 9-11, 1965; "Some Factors affecting the Enzymatic Hydrolysis of the Sodium Oestriol Glucuronide (NaEG) of Pregnancy Urine" by S. L. COHEN and R. WILSON at the 8th Annual Meeting of the Canadian Federation of Biological Societies, Ottawa, June 9-11, 1965.

RESEARCH

Reported by Dr. James A. Dauphinee

Grateful acknowledgment is made to the Canadian Medical Research Council, the Ontario Heart Foundation, and the Ontario Cancer Treatment and Research Foundation for generous grants-in-aid which have been made to all the Senior Members of the Department.

Studies of the copper metabolism in patients with Wilson's Disease and in patients showing similar neurological manifestations have been continued by Mr.

C. E. Downs and Dr. J. A. Dauphinee in association with Drs. J. C. Richardson, H. M. Barnett, T. C. Morley, and others on the Neurological and Neurosurgical Service of the Toronto General Hospital. Special attention is now being paid to the immediate and long-term effects of the administration of the chelating agents, such as penicillamine, which are used in the treatment of Wilson's Disease, on the excretion of trace metals other than copper. Mr. M. Sole and Mr. D. F. Prior, two of our Summer B.Sc.(Med.) students, are engaged in a critical study of the micro-analytical methods which are to be used in this investigation. Dr. A. D. Baines had continued his studies of the effect of damage produced by the administration of small amounts of potassium dichromate on the microscopic structure, histochemical enzyme activity, and on the secretory and reabsorbing functions of the cells of the renal tubules, special attention being paid to the changes which take place during the phases of recovery from a non-lethal dose of the toxic substance. A paper describing a portion of this work has been accepted for publication in the *American Journal of Pathology*.

Dr. S. H. Jackson, with Miss Florence Brown and Dr. C. P. Rance of the Hospital for Sick Children, has examined the nature of the different proteins appearing in the urine of infants and children suffering from various forms of kidney disease. They have found differences in the rate of renal leakage of albumin and transferrin into the urine in children with nephritis and nephrosis and they consider that these can best be explained by differences in the electric charges on the protein molecules rather than by the differences in their actual molecular size. Using proteins labelled with radioactive sulphur, Dr. Jackson has continued his studies of the changes in the catabolic rate of proteins caused by experimental injuries such as burns. He has shown that the bulk of the peptides excreted in the urine of burned patients appears to be degenerative products of collagen (paper in press for *Clinica Chimica Acta*) and he is now studying the usefulness of the determination of urinary hydroxyproline peptides as a means of assessing the extent and seriousness of burn damage in infants.

Dr. C. J. Porter, head of the Biochemistry Laboratory of the Toronto General Hospital, has been investigating abnormalities of porphyrin metabolism and has developed techniques for the isolation, identification, and quantitation in the urine of certain porphyrin precursors such as porphobilinogen and delta aminolevulinic acid. These procedures will now allow him to investigate in a much more satisfactory way than before the various kinds of porphyriurias that appear from time to time in human patients.

Dr. B. Cinader, Associate Professor and head of the Subdivision of Immunochemistry in the Department of Medical Biophysics and Associate in Pathological Chemistry, is responsible for the supervision of three of our graduate students: Dr. Chi-tao Chou, Mr. J. E. M. St. Rose, and Miss Lise Bernier, and with these and other associates he is carrying on a vigorous programme of investigations in immunochemistry including studies of the mechanisms of enzyme inhibition by antibody, antibody synthesis, the specificity of acquired immunological tolerance, and poly-morphism in animals. Working with Dr. Cinader, Dr. Chou has succeeded in inducing antibody formation by the injection of soluble antigen into newborn animals and he has been able to show that both tolerance and antibody response can be elicited during the early postnatal period in the life of the animal. For this work Dr. Chou has been awarded the Stuart Alan Hoffman Memorial Prize for 1965—a prize which is awarded each year to the graduate student in our Department who has shown special ability in research in pathological chemistry. Dr. Chou has also been awarded the W. P. Caven Memorial Fellowship. Also working with Dr. Cinader, Mr. J. E. M. St. Rose has continued his studies of immunological tolerance produced by molecularly modified antigens. A portion of this work was presented by Dr. Cinader at the meeting of the Swiss Society of Allergy and Immunology held in Locarno, Switzerland, in May 1965.

Miss Amy Britton has continued her studies of the binding of thyroid hormones to serum proteins. In collaboration with Dr. Brian Webster, who is working with Drs. Ezrin and Volpe of the Department of Medicine, she has shown that the early disappearance of administered thyroxin from whole blood is related to the amount of thyroxin-binding globulin which is present in the serum. Cellulose acetate has proved to be a more satisfactory material than starch gel for the electrophoretic separation of the thyroxin-binding proteins of serum as both the thyroid hormone and the protein fractions can be measured on the resulting electrophoretic strip. Methods for the determination of both the free and total amounts of thyroxin in blood are being established. A portion of this work was communicated by Dr. R. Volpe to the 5th International Thyroid Conference held in Rome, on May 23-27, 1965, under the title "Studies of Thyroxine Kinetics in the Central Compartment of Man and the Role of the Thyroxine-binding plasma proteins" by B. Webster, A. Britton, C. Ezrin, and R. Volpe.

Dr. Saul H. Cohen, in collaboration with Dr. R. Wilson, has developed a new method for the rapid assay of late pregnancy urinary oestrogens based on the capacity of 70 per cent (W/V) $(\text{NH}_4)_2\text{SO}_4$ to precipitate completely the oestrogen complexes from pregnancy urine and this procedure should prove to be of value in the determination of foetal viability. This work is being presented in a paper at the annual meeting of the American Endocrine Society in New York on June 19. Dr. Cohen has also continued his interesting investigations of the substances which inhibit the enzymatic hydrolysis of urinary oestrogen glucuronides.

Reported by Dr. A. G. Gornall

Research on basic aspects of the pathochemistry of hypertension have been extended by the following studies.

Dr. D. Ostrovsky, this year's recipient of the Reeve Prize, has continued his study of the effects of adrenal hormones, singly and in combinations, on cardiovascular responses of rats to angiotensin, renin, noradrenaline, and vasopressin. Under certain conditions a specific effect of aldosterone has been demonstrated. Mrs. H. Pavuls has provided valuable technical assistance with this problem. With the help of a student assistant, Mr. G. L. Weisbrod, studies were initiated on the contractile properties of heart muscle preparations from these animals.

Mrs. B. J. Cadeau completed her M.A. and has extended her research on the tissue uptake and excretion pathways of tritiated aldosterone in rats. Although certain tissues take up aldosterone, none of them retain it for more than a few minutes. The biological effects of this hormone clearly outlast its presence in measurable amounts in the tissues.

Dr. B. W. Thomas has investigated the effects of pregnancy on the blood pressure of normal and hypertensive dogs. The effects of continuous infusions of angiotensin on blood pressure and on aldosterone secretion have also been under study.

Mr. C. C. Liew is undertaking a study of biochemical factors affecting the function of heart muscle. An effect of adrenal hormones on oxygen utilization and metabolic pathways has been demonstrated. Miss M. Choong is a Summer Student Assistant on this project.

Mrs. M. Kandel has undertaken a new line of research on the separation, purification, and measurement of proteins, peptides, and amino acids. This knowledge will contribute to our studies of the renin-angiotensinogen reaction.

Mrs. J. Grant has carried out research on and been responsible for the routine bioassay of angiotensinogen.

Mr. M. Luke has been in charge of steroid separations and measurement by paper, thin layer, and gas chromatography. Along with Mrs. E. Kuhn and Mrs. M. Cohen studies of aldosterone secretion by dogs are in progress.

Dr. C. A. Cowell and Mr. M. H. King have completed during the year their research reports and all requirements for the B.Sc.(Med.) degree.

Reported by Dr. William Paul

The development of the Brain Scanner using radioactive isotopes in the external localization of brain tumours has been completed and reported. Attention has now been turned to an entirely new, and as yet only theoretical, possibility of constructing a gamma image intensifier for the same purpose. The project is being carried out in co-operation with members of the Institute of Bio-Medical Electronics and involves several parallel phases of experimentation. Our group has assumed the responsibility of designing the Sodium Iodide Crystal Absorbers and the measurement of their properties. This work is well under way.

Experimental work in the field of Ear Oximetry has been resumed and new facilities have been set up to measure the optical properties of a new R.C.A.F. earpiece.

PUBLICATIONS

- COHEN, S. L. and WILSON, R. "Some Factors Affecting the Enzymic Hydrolysis of the Sodium Oestriol Glucuronidate (NaEG) of Pregnancy Urine" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 8, June 9-11, 1965, p. 81).
- DEWOLFE, MARGARET S. "Autoimmune Mechanisms in Disease with Special Reference to Serum Alpha-2 Macroglobulin" (*Dissertation Abstracts*, vol. 25, no. 2, 1964, pp. 800-1).
- GORNALL, A. G. Reviews, *Canadian Medical Association Journal*, vol. 92, no. 2, Jan. 9, 1965, p. 102.
- KANDEL, M. and GORNALL, A. G. "Effect of Glass Surfaces on the Liquid Scintillation Counting of Aldosterone" (*Canadian Journal of Biochemistry*, vol. 42, no. 12, Dec., 1964, pp. 1833-7).
- OSTROVSKY, D. and GORNALL, A. G. "Effect of Adrenal Hormones on the Blood Pressure Responses to Angiotensin, Renin, Noradrenaline, and Vasopressin" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 8, June 9-11, 1965, p. 20).
- PAUL, W. and MORLEY, T. P. "Design and Function of a Brain Scanner for Clinical Use" (*Medical Radioisotopes Scanning*, vol. 2, 1964, pp. 81-94).
- PORTER, C. J. (with Bjerre, S.). "Simultaneous Determination of Barbiturates and Salicylates by Ultraviolet Spectrophotometry" (*Journal of Clinical Chemistry*, vol. 11, no. 2, part 1, Feb., 1965, pp. 137-54).

PATHOLOGY

Under the direction of Professor A. C. Ritchie

The Department continues to suffer greatly from lack of space. For example, one senior man has to occupy a museum room, as no other place is available. Two others are without office space. The technical rooms are grossly overcrowded and quite inadequate. The reconstruction of the area formerly occupied by the Boyd Museum will offer some relief, but will still leave the Department without space to house its present staff adequately, to perform its teaching efficiently, or to develop its research programme. When it is remembered that the present staff is barely sufficient to permit a reasonable standard of instruction, and is altogether inadequate to permit the expansion of the medical school proposed, and when the magnitude of the opportunity before us is realized, the urgency of the provision of more space needs no emphasis. We can make this Department and the Medical School second to none, but we need space, men, and facilities.

The suite for electron microscopes has at last been finished, and the microscopes have been installed. This has proved to be a very considerable advantage, but it is clear that more instruments will be needed as electron microscopy takes its proper place as one of the tools available to the experimental pathologist, and as correlative studies resting equally on morphology and biochemistry become increasingly valuable in experimental pathology.

The over-all pattern of undergraduate teaching by lecture, tutorial, and demonstration has continued unchanged. An attempt, not entirely successful, was made to reduce the content of the lecture course so as to provide more detailed

consideration of difficult or confusing parts of the subject. Suitable texts were named and the students left to read in them the section of the course omitted. Demonstrations of experiments were added to the tutorials, with mixed success. The division of the tutorial classes into gross and microscopic sections was abolished. Gross and microscopic material were presented together, using museum specimens, microscopic slides, and projection of pictures. Instructors attempted to use the material to introduce a general discussion of the topic presented. This proved a considerable improvement. The principal difficulty is that the groups are too large; each will have about twenty students next year. Smaller groups are highly desirable, but shortage of staff restricts further subdivision. Classes of this kind, in which discussion may range very widely, cannot be allotted to junior men. Case presentations of autopsy and surgical material continued to be successful in Special Pathology. In General Pathology, demonstration of autopsy and surgical specimens to illustrate the processes discussed was introduced with benefit. Several distinguished visitors addressed the classes. In view of the pressure on time, it might be better to arrange such special lectures in the evenings, and to invite those students interested to attend.

The practical classes in the course in Dentistry have also been modified, again with benefit. The course in Physical and Occupational Therapy has continued as before. Members of the Staff have also assisted in the courses arranged by the Canadian School of Embalming and by the Toronto Institute for Pastoral Training.

Graduate teaching has grown further, but has still far to go before it approaches the requirements of the developing medical community. The course in Advanced Pathology has been reorganized and will continue to consider in depth and detail various topics related to pathology in its broadest sense.

Postgraduate training for residents both in pathology and in other specialities needs very considerable expansion, both in quantity to meet the needs of the Province and in quality. Again, shortage of staff is a limiting factor.

Several members of the staff assisted in courses arranged by the Division of Postgraduate Medical Education, among them Dr. Ritchie, Dr. Steiner, Dr. Crookston, Dr. Susan Ritchie, and Dr. Phillips.

We are glad to welcome several new members to the staff. Dr. J. B. Walter has recently come to the Banting Institute as an Associate Professor, and will be active in teaching and research. Dr. H. T. G. Strawbridge has taken up his appointment as Chief Pathologist, Director of Laboratories, and Director of Research at the New Mount Sinai Hospital, with the rank of Assistant Professor. Dr. A. G. Bell has been appointed Assistant Professor, conjointly with the Departments of Medicine and Zoology. He will be setting up a unit to study human genetics. Dr. H. C. Rowsell of the University of Guelph has accepted an appointment as a Research Associate. We hope our collaboration will expand and prove fruitful. Dr. F. Legnami joined the staff of the Banting Institute as a Lecturer; Dr. S. Rabinovitch the staff of the Toronto Western Hospital; Dr. A. Katz the staff of St. Michael's Hospital; and Dr. P. Wentworth the staff of the Hospital for Sick Children. Dr. Dotten, Dr. Glynn, Dr. Le Beux, Dr. MacKay, Dr. Rochlani, Dr. Sadowski, Dr. Taichman, Miss McKeown, and Miss Lovett are new Fellows. We are also glad to welcome Dr. L. Jørgensen of the University of Oslo who is spending a year with Dr. Mustard as a Visiting Assistant Professor, and Dr. B. M. Herbertson of the University of Cambridge who is spending the summer in the Banting Institute in a similar capacity. Dr. A.-M. Jézéquel of the Centre de la Recherche Scientifique at Villejuif has decided to remain with us for a further year, also as a Visiting Assistant Professor.

It is with deep regret that we record the untimely death of Dr. A. J. Blanchard. Dr. Blanchard had retired from his post at Sunnybrook Hospital, but had continued to teach at the University. He will be much missed by his many friends.

Several members of the Department spoke to academic or scientific bodies.

Dr. RITCHIE lectured on neoplasia at McGill University, and spoke on emphysema to the Ontario Thoracic Society. Dr. MOVAT spoke on the role of PMN-leukocyte granules in hypersensitivity to the 3rd Canadian Conference on Research of the Canadian Arthritis and Rheumatism Society, on PMN-leukocyte and platelet granules in anaphylaxis to the American Society for Experimental Pathology, and on the role of leukocytes as indicators of vascular permeability in acute inflammation to the American Association of Pathologists and Bacteriologists. Dr. STEINER spoke on runt disease to the 3rd Canadian Conference on Research of the Canadian Arthritis and Rheumatism Society and acted as moderator at the Gordon Conference on the fine structure and chemistry of nuclei; Dr. JÉZÉQUEL spoke on the fine structural changes in nucleoli induced by actinomycin to the International Congress of Biology and addressed the Journées d'Hépatologie on the fine structure of the liver in cirrhosis; Dr. TAICHMAN spoke to the American Society for Experimental Pathology on the role of PMN-leukocyte lysosomes on the local Schwartzman reaction and Dr. URIUHARA on the pathogenicity of PMN-leukocyte lysosomes in allergic inflammation; Dr. ANDERSON gave a seminar on some structural aspects of metabolic disease at Queen's College, Dundee; Dr. ROSS spoke on liver biopsies at Queen's University, Kingston; and Dr. PHILLIPS spoke on the fine structure of the liver in cirrhosis to the Federation of Biological Societies and to the International Academy of Pathology and addressed the Ontario Medical Association on electron microscopy and liver disease.

The Department was fortunate in the many distinguished visitors who so kindly spoke to undergraduate or postgraduate groups, or spent time with us less formally. Among them were: Professor C. V. Harrison of the Postgraduate Medical School, London; Dr. W. Bernhard of the Institut de la Recherche Scientifique sur le Cancer at Villejuif; Dr. J. André of the Centre National de la Recherche Scientifique, Villejuif; Dr. A. B. Novikoff of the Albert Einstein College of Medicine, Yeshiva University, New York; Dr. K. R. Porter of Harvard University; Dr. D. Doniach and Dr. I. M. Roitt of the Middlesex Hospital, London; Dr. R. Good of the University of Minnesota; Dr. J. Wyllie of Queen's University; Dr. D. McGregor of Western Reserve University, Cleveland; Dr. J. G. Higginson of the University of Kansas; Dr. D. Svoboda of the University of Kansas; Dr. R. R. Race and Dr. R. Sanger of the Lister Institute, London; Professor R. Kourilsky of the University of Paris; Professor J. R. Robertson of the University of Adelaide; and Professor D. F. Cappel of Glasgow University.

RESEARCH

The research work done in the Department has continued to grow, and has shown itself of the greatest value not only for its own sake but in stimulating and markedly improving both teaching and clinical work. Many makeshift arrangements have been necessitated by the inadequate facilities, but this has not prevented good progress. The year has been particularly gratifying in that it has seen a considerable extension in our collaboration with other Departments, a trend which is very clearly of general advantage.

Dr. Ritchie and Dr. Shinozuka have continued their studies of the initiating stage of epidermal carcinogenesis in the mouse. Further evidence has been gained to support the hypothesis that the carcinogens used may affect the synthesis of D. N. A. Mr. Zelcer, a summer student, is assisting with the autoradiographic work. Dr. Rochlani and Dr. MacKay have begun on a study of the breast in man and animals, with a view to comparing the hyperplastic and neoplastic changes which occur in that organ with those found in the skin and liver in other studies performed in the Department.

Dr. Movat, with Dr. Uriuhara and Dr. Franklin of the Department of Bacteriology, is studying the vascular and cellular alterations induced by the granules of polymorphonuclear leukocytes. With Dr. Murray of the Department of Biochemistry,

Miss Wasi and Dr. Movat are investigating the protolytic activity of these granules. With Dr. Taichman and Dr. Uriuhara, Dr. Movat has continued to study the Schwartzman reaction and has extended the work to anaphylaxis in the rabbit. Miss Lovett, Dr. Taichman and Mr. Berger, a summer student, have begun the isolation and identification of the anaphylactic antigen in various species, and are studying its effect. With Dr. Mustard, Dr. Movat is investigating permeability factors released from platelets, and with Mr. Helm, a summer student, is studying the permeability factors which arise during the interaction between antigen-antibody complexes and normal serum. The role of complement is being studied with Dr. Wardlaw of the Connaught Laboratories.

Dr. Steiner and Dr. Miyai have continued their study of the changes induced in the liver during ethionine intoxication. With Dr. Arakawa and Dr. Jézéquel, Dr. Steiner has continued to study the ultrastructural changes found in the liver in runting disease. Miss Perz, a student working for the summer, is continuing a study of cell population dynamics in runting disease.

Dr. Jézéquel and Dr. Steiner are collaborating with Dr. Sinclair of the Department of Bacteriology in studying tissue cultures of cells infected with a virus recovered from patients with infectious hepatitis. Human liver and jejunal biopsies from patients with hepatitis and livers from infected monkeys are also being studied. Dr. Jézéquel is also studying the changes induced in the liver by ligating the bile duct.

Dr. Le Beux and Dr. Steiner, in collaboration with Dr. Hetenyi of the Department of Physiology, are using electron autoradiography to study glucose metabolism in rat liver. Dr. Sadowski, Miss McKeown and Dr. Steiner are developing techniques for the isolation of nuclei and nucleoli, with a view to applying these methods to the study of hyperplastic and neoplastic changes in the liver and skin. Dr. Walter, in collaboration with Miss Harris, a summer student, is investigating the localization of antibody-producing cells. Dr. Bell is investigating families in which a genetic element may be of importance in the causation of disease. Muscular subaortic stenosis is a case in point. Dr. Susan Ritchie is studying the juxtaglomerular apparatus in human hypertension.

Dr. Anderson has continued his work on the nutrition of tendons, with particular reference to disease of the conjoined tendon of the shoulder joint. Dr. Thompson with Dr. Delarue of the Department of Surgery has continued a study of the value of exfoliative cytology in screening healthy employees. He has also assisted in setting up in the Faculty of Dentistry a diagnostic cytology service for oral lesions. Dr. Phillips and Dr. Steiner have continued their studies of the fine structure of the liver, with particular attention to the changes seen in human cirrhosis and their similarity to the state in the embryo. Dr. Mustard and Dr. Glynn have shown that platelets may phagocytose latex particles, and in collaboration with Dr. Movat have shown that immune bodies are treated similarly.

Dr. Jørgensen, with Dr. Mustard and Dr. Rowsell, has studied myocardial infarcts induced by injecting ADP into a coronary artery in pigs. Dr. Rowsell and Dr. Mustard have also studied the transformation of platelet-rich arterial thrombi to plaques rich in smooth muscle and collagen. Dr. Dotten, with Dr. Ritchie and Dr. Mustard, has begun a study of the conducting system of the heart in cardiac disease in man. Mrs. Crookston and Dr. Crookston have continued to study autoantibodies, with particular reference to Anti-I and Anti-i. The use of red cell and serum groups as genetic markers is also under study. Dr. Young is examining the value of routine unsolicited laboratory estimations in the detection of unsuspected disease, and is active in a study of means of measuring the efficiency and quality of clinical laboratories. Dr. Ross has investigated the relationship of iron deposition to cirrhosis in man, without finding a clear relationship.

Dr. Katz, with Mr. Schillinger, a summer student, is studying the sera from patients with malignant disease in an attempt to demonstrate antibodies to skeletal

muscle. Dr. Jaffe is studying the significance of certain postmortem changes, and the role of fungal species in the in vitro and postmortem production of ethyl alcohol. Dr. Conen is studying the ultrastructure of the lung in the neonate, with particular reference to the idiopathic respiratory distress syndrome of the newborn. He is also continuing his studies of chromosomal changes in patients with malignant disease or congenital malformations, and is studying the ultrastructural changes in dystrophic muscle. Dr. Sass-Kortsak, with Mr. Bartucz, a summer student, is studying amino acid metabolism in the newborn, with particular reference to glycine. Dr. Brown has compared and evaluated various methods of histologically grading carcinoma of the breast, and is studying the influence of radiotherapy on circulating cancer cells. He is also collaborating in a study of Hodgkin's disease. Dr. Strawbridge is completing a study of the significance of epithelial crescents in renal glomeruli, and is continuing to study the non-streptococcal glomerulonephritides. A new form of disease seems to be emerging.

In addition, many members of the staff have written or collaborated in reports of cases or groups of cases.

DIVISION OF NEUROPATHOLOGY

The work of the Division has been maintained at a high level by Dr. Tom and Dr. Rewcastle, in spite of the difficulties caused by the continuing lack of a head. It is to be hoped that a successor to Dr. Olszewski will be found soon.

It is with regret that we must announce the retirement of Dr. Mary Tom. All who have known her during the many years she has been in this Division will wish her a long and happy retirement, but all will know how impossible it will be to replace her in the Division. She leaves knowing that she has gained the affection and respect of all who know her, and she can be secure in the knowledge of good work well done.

Undergraduate and postgraduate teaching have continued as in the past, though the lecture course in neuropathology was moved from second to third year. The demand by postgraduate students for more openings for clinical and investigative training continues, and will pose a considerable challenge in the future.

We are glad to welcome Dr. R. S. McPhedran who has joined the Division as a part-time Research Associate, and Dr. Esparza and Dr. Deck who are spending a year with us as Fellows.

Dr. Rewcastle spoke to the British Neuropathological Society on "Glutaraldehyde—A Routine Fixative for Light and Electron Microscopic Examination of the Nervous System"; to the Symposium on the Limbic System and the Hypophysis at the University of Ottawa on electron microscopic studies of the ependymal lining of the third ventricle; and to the Academy of Medicine, the Canadian Association of Pathologists, and the Canadian Neurological Society on the intraneuronal Lafora bodies of myoclonic epilepsy.

Dr. Ezrin spoke to the Roswell Park Memorial Institute on the cytophysiology of the human hypophysis and assisted in a panel on the pituitary and hypothalamus at the University of Buffalo. He also spoke on pituitary cytology at Montefiore Hospital, New York.

RESEARCH

Dr. Rewcastle has continued to study the phagocytosis and uptake of iron compounds and labelled protein by pial cells of the subarachnoid space and their passage into the underlying brain. In addition, virus-like particles have been identified in two uncommon diseases, in the nuclei of oligodendrocytes in multifocal leucoencephalopathy and in the nuclei of neurones and oligodendrocytes in sclerosing

leucoencephalitis. The ultrastructure of the neurofibrillary tangles and senile plaques of Alzheimer's disease have been elucidated, and the nature and development of Lafora's intraneuronal cytoplasmic inclusions determined. Lesions are being placed in the dentate nuclei of cats in an attempt to produce hypertrophic degeneration of the inferior olive.

Dr. Humphrey has continued histochemical studies of skeletal muscle enzymes, with particular reference to neurogenic disorders. With Dr. McPhedran and Dr. Rewcastle, he has investigated the fine structure of muscle fibres in inflammatory myopathia. The effect of 2,4-dichloroacetate on experimental myotonia and the changes in chronic hypothyroid cats and rabbits are also under study. With Dr. Rewcastle and Dr. Humphrey, Mr. N. Iscove, a summer student, is studying morphological changes in human muscle biopsies from patients with amyotrophic lateral sclerosis.

Dr. Ezrin has continued to analyse the cytology of the pituitary. He has distinguished by staining seven cell types (to correspond to the seven known hormones) and is turning to electron microscopy to compare the fine structure of the cells with their microscopic appearance. With Dr. Lakshman he has continued bioassay of the gonadotrophins, and is comparing the findings with the numbers of the various cell types present.

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PHARMACOLOGY

Under the direction of Professor E. A. Sellers

For a number of years the report of this Department has emphasized a growing and, latterly, wide discrepancy between the commitments for teaching and for associated activities and the amount of space, the personnel, and the financial support available to meet these commitments. The announcement by the Province that this discrepancy was recognized and that the inadequacies would be rectified has been received with pleasure. The aim of the Department and of the University has been, and is, to achieve and maintain high standards of scholarship; agreement by the Province that this aim was shared and would be supported was welcome. As part of the plan, and in addition to correcting the serious deficiencies which existed, the number of medical students was to be increased by about one-third, and both these objectives were to be effected as rapidly as possible—within 3–5 years. These changes will result in more than doubling the size of the over-all operation of the Faculty. To achieve such an objective, while at the same time raising the standard of teaching, is a challenge with few parallels. It demands imaginative planning of physical facilities, a major change in the curriculum and in the organization of the Faculty. The reason for referring to this in a departmental report is that a department is an operational unit of a faculty.

The Department of Pharmacology welcomes the opportunity to participate in this development. However, to achieve the objective the full backing of the administration of the University will be necessary. It has been reported previously that the financing of the operation of the Department leaves much to be desired. At present, approximately half of the total budget is derived from non-University sources; judging from the number of demands on research granting agencies compared with the funds available for distribution, it would seem most unlikely that this division of total operating costs will be maintained. Nor should it be. Thus the University will have to assume a higher proportion of operating costs, and so far there is little indication that this problem has been faced. Delay in planning and financing an increased scale of operations will certainly affect *when* the objective will be achieved; it may even decide *whether* it will be achieved.

The activities of the Department have continued much as in former years. We have shared the experience of most other departments in the University of observing an appreciable increase in number of students in courses offered in the Department. While the trend is predictable, the numbers in particular courses in any one year have often differed from expectation. This year one of the courses which has been offered as an option to half a dozen students, quadrupled in size. The point of interest is that the laboratory classes for this group have been given in the Laboratory of the Attorney-General, under Professor H. Ward Smith, and we are most impressed and gratified with the ability and willingness of this laboratory to cope with a large class rather than a small group.

The use of facilities financed and sponsored by provincial, federal or industrial organizations outside the University for special educational purposes extends the services of the University in a major way. We have previously acknowledged the co-operation of the Laboratory of the Attorney-General of the Province of Ontario, the staff of the Food and Drug Directorate of the Department of National Health and Welfare, and the staff of the Defence Research Medical Laboratories; the support these and other organizations afford the University is of great value, and is greatly appreciated.

Lecture and laboratory courses were offered to the third year of Dentistry, fourth year of Pharmacy, second year of Medicine, fourth year of Food Chemistry, and, in collaboration with the Department of Therapeutics, fourth year of Medicine. We participated in courses offered by the Division of Postgraduate Medical Education and by the Departments of Ophthalmology and Anaesthesia.

A number of changes in staff occurred during the year. We were pleased to welcome Professor W. G. Bruce Casselman to the Department in April, 1965. Professor Casselman has returned to Toronto after an absence of seven years during which time he served on the staffs of the College of Physicians and Surgeons, Columbia University, and the Institute for Muscle Disease in New York City, and directed the Training Section, Geigy Chemical Corporation, Ardsley, N.Y. A large part of Professor Casselman's time will be occupied with planning for the proposed Medical Sciences building. Professor F. A. Sunahara, after graduating from the University of Western Ontario, spent a number of years at the Defence Research Medical Laboratories and with Ayerst, McKenna and Harrison in Montreal, before joining the Department in November, 1964. Professor R. Sinha was appointed an Assistant Professor in August, 1964, but will not continue in this position after the present session.

Professor W. Kalow was given a leave of absence to take up an appointment as Director of Biological Studies, C. H. Boehringer Sohn at Ingelheim, Germany. From the viewpoint of the Department it is hoped that Professor Kalow will not find the pharmaceutical manufacturing industry too attractive. His leaving undoubtedly affected the research group directed by him and it is with regret that the resignation of Professor Nancy E. Simpson, a Queen Elizabeth II Scientist, was accepted. Professor Simpson is a "human geneticist" and in her new position at Queen's University, Kingston she should have more scope to pursue a career in this field than in a department of pharmacology.

Lastly, Miss Dorothy Caldecott, formerly Secretary of the Department and latterly its Librarian, will retire at the end of the session. Her long and valued services to the University have been much appreciated. All those who have been associated with her join in wishing her many more years of health and happiness.

Graduate students have completed the following theses: for the M.A. degree—A. M. Katz, "Isoenzymes of Normal and Myopathic Human Tissues"; for the Ph.D. degree—R. A. Hickie, "The Influence of Divalent Cations on Some Membrane Properties of Normal and Malignant Cells."

RESEARCH

Under the direction of Professor E. A. Sellers, Dr. W. J. Russell Taylor and his associates, Drs. A. Diosy and D. Wainwright, have continued their research in the field of clinical-pharmacology. They are currently evaluating the clinical use of intravenous ethamivan (Arlington-Funk) and doxapram hydrochloride (Robins) in acute respiratory failure associated with chronic chest diseases (usually emphysema), as a alternative to intermittent positive pressure respiration.

In a chronic oral study, four pneumokinetic drugs are being evaluated on out-patient subjects with chronic chest disease. Methods for the qualitative detection of test drugs in the blood have been developed so that it can be determined objectively whether or not subjects actually took medication prescribed for them. If methods can be perfected, blood levels will be measured. For the past seven years, medical students have been used both as subjects and as observers in a series of double-blind experiments designed to determine possible toxic effects following the oral and intramuscular administration of various anticholinergic drugs, a sympathomimetic pressor agent, and an oxime. The study was conducted as part of the laboratory course in Pharmacology and was intended to familiarize medical students with the pharmacologic action of the drugs administered as well as to demonstrate an experimental method in clinical drug evaluation. A new gastric meal technique was evaluated at the Toronto Western Hospital in conjunction with Dr. J. Bingham's laboratory. Patients hospitalized for peptic ulcer were used as subjects. The technique will be valuable for testing new anticholinergic agents and plans are under way with the support of certain pharmaceutical manufacturers.

Professor E. Schönbaum and Dr. Sellers are continuing their studies on the assay

and function of thyrotropic hormone, and the role of thyroxine in the control of thyroid function (positive vs. negative feed-back system controlling thyrotropic hormone release). They are collaborating with Drs. C. Ezrin and R. Volpe of the Department of Medicine in clinical studies on thyroid function. In addition, studies of the circulating blood levels of thyrotropic hormone in medical student volunteers, and studies of long-acting thyroid stimulator (LTS), a material suggested as a causal factor in Graves disease, are in progress. Drs. Sellers and Schönbaum, with Professor G. E. Johnson, have extended their investigations of the interaction of environmental temperature and autonomic nervous system activity, especially on the responses of partially immunosympathectomized rats. In spite of an impaired adrenergic nervous system, these animals can become acclimatized to cold and are able to increase their excretion of noradrenaline. Such rats also show altered drug responses and are proving to be very interesting models for pharmacological studies.

Under Professor W. Kalow's direction, Mr. Arnold Katz continued studies on isoenzymes of normal and diseased human muscle. He demonstrated a number of different isoenzymes which may lead to a better understanding of disease-processes affecting muscle. The work was supported by the Muscular Dystrophy Association of Canada. Professor Nancy E. Simpson has continued a study of families of known diabetics, sponsored by the Canadian Diabetic Association, on the genetic factors relating to diabetes mellitus. She has collaborated in an international study of the genetic characteristics of a population of 7,000 Brazilians. Part of this work has been done in association with Dr. N. E. Morton at the University of Hawaii. Drs. Kalow and Kalant, with Dr. Peter Fleming of the Hospital for Sick Children, jointly directed the work of Mrs. Irene Ockenden in a study of factors influencing the absorption of cloxacillin. This first required the development of an assay procedure for cloxacillin based on inhibition of cephalosporinase. The principal studies carried out by Dr. J. N. Cummings included those on promethazine, a phenothiazine derivative which is an antihistaminic and a tranquilizing drug, and its effects on pregnant female animals and the foeti. It was found that the drug had a marked hypotensive effect when given to the female animal, but no added depression was observed in the foeti beyond that induced by the general anaesthetics used. The initial states of pulmonary hyaline membrane disease of the newborn (I.R.D.S.) were successfully reproduced in foetal rabbits near term, by delivering the foeti by Cesarean section after the mother had passed into a state of shock. It was found that, in rabbits, the histamine levels rose after mid-pregnancy to three times the pre-conception levels and then suddenly dropped one day before delivery. They rose again during the post partum period. Techniques for maintenance of the foetal lamb in an extra-uterine environment on an artificial placenta were developed, and survivals up to 12 hours were attained. This work was carried out in co-operation with the Neonatal Research Unit, Hospital for Sick Children, and with the Ontario Veterinary College, Guelph.

Under the direction of Professor H. Kalant, work has progressed actively on the biochemical effects of ethanol on the nervous system. Dr. Y. Israel and Dr. M. A. Mahon have established clearly the inhibitory effect of ethanol on sodium and potassium transport across cell membranes, and on the release of acetylcholine, and have shown that these effects are probably basic to the nature of alcohol intoxication. They are currently exploring the possible importance of these effects in the production of tolerance and dependence phenomena, on chronic treatment with alcohol. At the same time, Dr. J. M. Khanna has shown that the liver increases its capacity for oxidizing ethanol on chronic treatment, and Professor E. R. Tustanoff is examining the effects of this adaptive change on other intermediary metabolic pathways in the liver. With Mr. R. A. Hickie, studies have continued on the differences between normal liver and Morris hepatoma, with respect to sialic acid content, calcium binding, and cell membrane permeability. Many apparent contradictions in the literature, especially in relation to calcium content of malignant

tumors, have been clarified. Fruitful collaboration with Professor R. K. Murray, Department of Biochemistry, has continued during the year.

In Professor F. A. Sunahara's section effort is being directed toward setting up research facilities and equipment for pharmacological investigations of agents which have primarily cardiovascular effects. Studies have been initiated on the pharmacology of vasoactive material obtained from the renal medulla. The first phase of this project concerns the role of the renal medulla in the etiology and maintenance of hypertension in animals with experimental renal hypertension. In addition, the pharmacology of the vasodepressor substance obtained from the rabbit renal medulla is being further investigated. Its biological and chemical properties were found to be similar to those of prostaglandin E by Dr. Sunahara when he was with Ayerst Research Laboratories in Montreal.

Professor G. E. Johnson's section has conducted research on the influence of drugs on the sympathetic nervous system, particularly agents which diminish the synthesis of noradrenaline. It has been found that the drug, N-(DL-seryl)-N'-(2, 3, 4-trihydroxybenzyl)-hydrazine (Ro4-4602), which inhibits dopa decarboxylase, does not decrease the secretion of noradrenaline so long as animals are kept in a thermoneutral environment. However, when rats treated with Ro4-4602 are subjected to cold stress, which normally requires increased noradrenaline secretion, the effects of the enzyme inhibitor are evident in diminished release of noradrenaline, which is accompanied by an increased release of adrenaline. Hypothermia and death result when not sufficient adrenaline is secreted to overcome the relative noradrenaline deficiency. A study has been started on the influence of "false sympathetic nervous system transmitters" upon the ability of an animal to withstand a cold stress. The drug metaraminol, which, when injected, rapidly replaces noradrenaline in sympathetic nerves, has been chosen for this study. Further investigations are in progress on the interrelationships between thyroid function and the release and action of adrenaline and noradrenaline.

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- KALANT, H., MURRAY, R. K. and MONS, W. "Effect of EDTA on Leakage of Proteins from Slices of Normal Rat Liver and DAB-induced Hepatoma" (*Cancer Research*, vol. 24, 1964, pp. 570-81).
- KALOW, W. "Dose-response Relationships and Genetic Variation" (*Annals of the New York Academy of Sciences*, vol. 123, 1965, pp. 212-18).
- "Glaucoma Research Conference" held at Santa Barbara, Calif., June 25-27, 1964 (*American Journal of Ophthalmology*, vol. 58, Dec., 1964, p. 1066).
- "Individual Variation in Drug Metabolism as Cause of Drug Toxicity"; in *Drugs and Enzymes*, Proceedings of the Second International Pharmacological Meeting, Prague, Aug. 20-23, 1963, pp. 245-55. 1965.
- "Pharmacogenetics and Anesthesia" (*Anesthesiology*, vol. 61, 1964, pp. 238-43).
- LETTAU, H. F., SELLERS, E. A. and SCHÖNBAUM, E. "Modification of Drug-induced Hypothermia" (*Canadian Journal of Physiology and Pharmacology*, vol. 42, 1964, pp. 745-55).
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- SIMPSON, N. E. and KALOW, W. "Comparisons of Two Methods for Typing of Serum Cholinesterase and Prevalence of its Variants in a Brazilian Population" (*American Journal of Human Genetics*, vol. 17, 1965, pp. 156-62).
- "The 'Silent' Gene for Serum Cholinesterase" (*ibid.*, vol. 16, 1964, pp. 180-8).

PHYSIOLOGY

Under the direction of Professor Charles H. Best

The undergraduate teaching load of the department of Physiology is increasing. During this past year there were 1,033 students taking lecture courses in the department and 687 attending laboratory classes. These included students of the first and second medical years, honour Arts students in Physiology and Biochemistry, students in Psychology, Household Economics, Dentistry, Dental Hygiene, Physical and Health Education, Nursing, Physical and Occupational Therapy, Pharmacy, Speech Pathology and Audiology, Dental Graduates, Graduates, and Special Students.

Seven students were enrolled in the B.Sc. (Med.) programme. In addition, in the Graduate Department, there were 4 M.A. candidates and 8 students proceeding toward the Ph.D. degree. With the increase in teaching responsibilities, new staff is urgently required but immediate acquisition of new staff is made difficult by the lack of space for their work.

During this past year, some project teaching was introduced into the second medical year and some further trials were carried out on the use of closed-circuit television in our teaching.

Members of the Department took an active part, along with other members of the Charles H. Best Institute, in organizing and staging the Fifth Congress of the International Diabetes Federation held in Toronto July 20–24, 1964. More than 2,000 registered members and associate members from 45 different countries attended these meetings.

A number of honorary members of the Department have assisted greatly during the past year. These are Professor W. S. Hartroft, Professor W. Johnson, Professor D. Fraser, and Professor J. Martin. Dr. J. Archibald, Honorary Consultant Veterinarian, has given valuable help in relation to the animal care.

During the session 1964–65 the School of Graduate Studies assisted the Department in obtaining as visiting lecturers Dr. A. Kuksis of Queen's University, Dr. P. P. Foa of the Division of Research, the Sinai Hospital of Detroit, Dr. C. R. Park of Vanderbilt University, Nashville, and Dr. C. Fortier of l'Université Laval. In addition, a lecture was also presented by Dr. K. Taylor of King's College Hospital, London, England. We appreciate this stimulating contribution to the graduate training programme and to research provided by the School of Graduate Studies.

Lectures were presented by visitors who were conducting investigations in this University, namely, Dr. E. Kallee of the University of Tübingen and Dr. P. Forcier of l'Université Laval, as well as by Dr. A. C. Bryan, R.C.A.F., of the Institute of Aviation Medicine, Department of National Defence. Members of the University staff in other Departments who contributed papers also were Dr. S. Wilson of the Connaught Medical Research Laboratories, Dr. R. J. Shephard of the Department of Physiological Hygiene, and Dr. J. R. Evans of the Department of Medicine.

Professor R. E. Haist was invited to participate in a symposium on the Islet Cells at the Fifth Congress of the International Diabetes Federation, Toronto, and presented a paper on "Effect of changes in stimulation on the structure and function of islet cells." Professor J. W. Scott spoke on "The cortical evoked responses" at the Conference on the Identification and Management of the Very Young Deaf Child, Toronto, and on "The use and abuse of the EEG in aircrew selection" at the ARGARD Meeting of NATO, Lisbon, Portugal. Professor O. V. Sirek was invited to take part in a discussion on diabetes in gestation and infants of diabetic mothers at the Fifth Congress of the International Diabetes Federation and spoke on "Serum proteins in newborn infants of diabetic mothers."

Members of the Department presented papers at the Fifth Congress of the International Diabetes Federation, Toronto, the meetings of the Federation of American Societies for Experimental Biology, Atlantic City, the Canadian Federation

of Biological Societies, Ottawa, the meetings of the American Diabetes Association, Atlantic City, the Canadian Society for Clinical Investigation, Toronto, the Academy of Medicine, Toronto, the Toronto Diabetes Association, and the Toronto Biochemical and Biophysical Society.

Professor A. M. Rappaport received the Honors Achievement Award from the Angiology Research Foundation.

Two M.A. theses were accepted during this year: Liew, Choong-Chin: "A comparison of the actions of DBI and of insulin on the adenosine triphosphate content of muscle"; Nakeff, A. N.: "Injury and recovery of the hematopoietic system of the albino rat exposed to simulated fallout doses of gamma radiation."

RESEARCH

The Department has been active in research, an outline of which follows:

In Professor R. E. Haist's section, Dr. J. K. Davidson has studied extensively the effect of a large number of factors on glycogen synthesis by the mouse hemidiaphragm in an attempt to establish the specificity of this method for the bioassay of insulin. With Dr. M. A. Ashworth and Dr. B. Lin he has investigated the effect of a glucose load on blood insulin levels and is studying the influence of tolbutamide and of puromycin treatment on the effect of a glucose load on the secretion of insulin by the pancreatic islets.

Miss J. Quinlan and Mrs. A. Crawford are studying the effect of hypothermia on the blood insulin levels and the effect of tolbutamide on these levels in hypothermic rats. Mrs. Crawford has investigated the influence of hypothermia and the effect of tolbutamide and of growth hormone on the glucose and inorganic phosphorus levels of blood. Dr. B. Lin and Mrs. M. Evans have developed the Berson and Yalow immunoassay technique and immunoassay and bioassay procedures are being carried out on the same blood samples in the animal experiments. In collaboration with Dr. C. C. Yip, Dr. Lin has microdissected islets from mice and from duct-ligated rabbit pancreas and together they are using these to study the nature of the insulin in the pancreas. Mrs. M. Henderson Santalo has completed her study on the effects of hypothermia and insulin on the distribution of glucose in tissues. It became apparent that in liver, the effect of insulin on glucose space was related to the plasma glucose level. It was found that insulin increased the glucose space of liver only in the presence of hypoglycaemia. With Mrs. S. Sellers, she has been attempting to find whether or not hypoglycaemia resulting from phlorizin also results in an increase in the glucose space of liver. Mr. M. Kroch completed his study of the effect of hypothermia on the potassium and sodium changes following injections of insulin glucagon and epinephrine and outlined these in his thesis for the B.Sc. (Med.) degree.

In Professor J. Campbell's section, Dr. K. S. Rastogi, Mrs. V. Lazdins, and Mr. G. R. Green studied relations of the growth hormone of the anterior pituitary gland to the activities of the pancreatic islets. The daily administration of the hormone in dogs produced maintained elevation of insulin concentrations in serum, and greatly augmented the rise in serum insulin in response to the infusion of glucose. These changes were associated with induction of diabetes. No alteration in the rate of uptake of injected insulin was found. The effects of cortisone, glucagon, and epinephrine on serum insulin were also investigated.

In co-operation with Dr. H. R. Hausler and Dr. Rastogi it was found that the diabetogenic effects of cortisone and growth hormone in the Chinese hamster were associated with high levels of insulin in serum. With Mr. Green, the high levels of free fatty acids in serum of the Chinese hamster were found to be associated with relatively high rates of release of these acids from adipose tissue *in vitro*. With Mr. Green, the role of plasma albumin and total protein in the regulation of fatty acid metabolism under various conditions has been studied. In co-operation with Professor A. M. Rappaport and Dr. M. Vranic of this Department, the effects of alteration of blood supply to the liver on lipid metabolism in diabetes were investigated.

Mr. K. Shumak's research on the interrelations of the hypothalamus and adenohypophysis in lipid metabolism was described in his thesis submitted for the B.Sc. (Med.) degree.

In Professor G. J. Hetenyi's section experiments investigating the turnover of lactic acid in the blood of dogs were initiated by Dr. N. Forbath and Dr. Hetenyi. The same investigators with Dr. R. Ninomiya demonstrated a biphasic effect of adrenal steroids on hepatic glucose production, namely, an inhibition followed by a strong stimulation. During the latter period, in spite of a normal plasma glucose level, an increased turnover of glucose was demonstrated. Mrs. F. Waterman and Dr. Hetenyi worked out a new approach for the calculation of the distribution space of galactose in the eviscerated rat and its different organs. Dr. Ninomiya is working on a computer programme simulating an intravenous glucose tolerance test in dogs.

Professor F. C. Monkhouse, with Mrs. S. Milojevic, has continued investigations into the function of plasma antithrombin in blood coagulation. Improved purification of the enzyme has been accomplished by the use of vertical curtain electrophoresis and column chromatography. Activity and stability studies are being carried out using the purified product. Dr. Monkhouse, with the assistance of Miss S. Christie, is investigating the importance of clearing factor lipase in fat metabolism and the prevention of hyperlipemia. Experimental lipemia is being induced by a variety of agents such as CCl_4 , triton, and India ink. The value of synthetic sulphated polysaccharides as agents for releasing clearing-factor lipase is also being studied.

Dr. A. Horner, with Mrs. D. Coles, is studying the various types of mucopolysaccharides found in different animal tissues with the hope that a better understanding of their physiological role will be obtained. Dr. D. Aitken joined the section in October and plans to make a study of the physiological importance of fibrinolysin (plasmin) in preventing thrombosis.

In Professor A. M. Rappaport's section, research is continuing on the simultaneous measurement of portal and of hepatic arterial blood flow with electromagnetic flowmeters. This work is done in co-operation with Dr. Llewellyn Thomas, Institute of Biomedical Electronics, and Dr. A. B. Fairley and Dr. G. D. Blenkarn, Department of Anesthesia, Toronto General Hospital. The *in vivo* study of the mammalian hepatic microcirculation has been continued and the results of this study will be presented at the Journées Internationales d'Hépatologie in Lyon (France), June, 1965.

The study of the immediate effects of sudden deprivation and subsequent restoration of insulin secretion on glucose metabolism and insulin level in dogs has been continued in collaboration with Professor G. A. Wrenshall, Dr. M. Vranic, and Dr. J. K. Davidson. The findings were presented at the Fifth Congress of the International Diabetes Federation, in three papers and an exhibit. Dr. Rappaport and Dr. Vranic together with Dr. Wrenshall and Mr. J. S. Cowan, by the application of tracer techniques, have been investigating the effects of hepatic ischemia in diabetic dogs. The experimental procedure of hepatic venography developed by Dr. Rappaport in co-operation with Professor R. B. Holmes of the Department of Radiology has further proved its value in clinical applications.

During the past year three projects have been actively pursued in Professor J. W. Scott's section. First, Dr. M. Smith has continued the study of the electrical activity of the mammalian semi-circular canals, having perfected and developed a technique of implanting an electrode in the eighth cranial nerve and producing a chronic preparation.

Dr. M. Hunter has continued the study of muscle tone in the human. He also has been developing and testing methods of stimulating the bladder electrically in the paraplegic patient. Dr. Shirley Appleby in conjunction with the Department of Otolaryngology has continued the use of the averaged evoked cortical response to sound clicks as a means of assessing hearing in the newborn. Dr. R. Tasker, Department of Surgery, has continued his close liaison with this section in his studies of dyskinesias.

In Professor O. V. Sirek's section research continued along three lines of interest. In collaboration with Professor Anna Sirek it was found by immunoelectrophoresis that a hemoglobin-binding globulin was partly responsible for the elevated serum glycoprotein levels observed in infants of diabetic women. The possible role of alpha-2-macroglobulin as a carrier of insulin in human serum was investigated with Dr. H. Geerling, NATO fellow of the University of Homburg/Saar, Germany. It was concluded from immunological and ultracentrifugal studies that the protein is of no physiological importance for the transport of insulin in blood. In collaboration with Dr. A. Sirek and Dr. Eva Geerling, visitor of the University of Homburg/Saar, Germany, it was established that serotonin is released into the blood stream following administration of growth hormone to dogs.

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PSYCHIATRY

Under the direction of Professor A. B. Stokes

Any organization that has an exuberant vitality and a forceful growth will from time to time present special problems in the utilization of resource: the gardener, the farmer, the family, the populace, the industrialist, the banker are very evidently concerned at times with growth pressure within limiting confines. Various modes of dealing with the different situations have evolved, ranging from pruning severance, through rational repatterning, to selective fostering. In any medical department, including the Department of Psychiatry, the same issues arise and the same modes of operation are employed. But whereas pruning and reorganization are within the bounds of departmental autonomy and responsibility, fostering is a matter of aid from without. The ways in which such aid is proffered turn on outside perceptions of service, education, and research in the medical field.

The Department of Psychiatry, as with other medical academic organizations, has, over the years, emphasized (a) high exemplary standards of clinical service for the purposes of education and research, and (b) the integration of the academic

triad into an organized whole. The difficulty invariably arises, however, that each of the elements in the whole is regarded differently and supported differently in terms of finance.

The unity of medical education and research (and, by implication, medical services) is the subject of a recent leading article in the *Canadian Medical Association Journal*. There the inseparable problems of medical education and research are raised not as "a subject for leisurely philosophical argument" but as "a pressing matter of immediate national importance." Again the Harveian Oration of 1964 (Sir George Pickering) deals, from another standpoint, with Physician and Scientist. After an examination of the differences between practising physician serving ill patients and the medical scientist seeking to enrich knowledge, the author concludes "for the future of humanity the objectives of the two roles, however difficult they may be to combine in an individual and at a point of time, are ultimately one and the same." In short, a deal of thinking is being given to the unified needs of medical services, teaching, and research.

This thinking has been evident in the planning of the Clarke Institute of Psychiatry as a functioning organization. The building is well advanced in structural terms and will be opened some time in the New Year 1966. The Institute Board has negotiated an agreement with the Board of Governors of the University and will seek, within the provisions of the agreement, to promote the development of psychiatry, its teaching and its application. The problems and difficulties of unitary financing are in the process of exploration, with hopeful outlook as to resolution. Meanwhile departmental activities continue to be based on the Toronto Psychiatric Hospital with extensions to the University teaching hospitals and affiliated clinics and services.

Undergraduate classes have been held in each of the four medical years with some modification of content in the first two years. The undergraduate committee, under Dr. W. E. Boothroyd, has moved slowly but surely to bring about a progression of instruction in parallel to other medical studies: the intent is to represent continuously to the student the relationships of organ medicine and functional disability. The final examination showed a good standard but one that could be improved. The undergraduate committee is involved in a national appraisal of undergraduate teaching to be considered at a conference of university departments of psychiatry in October next.

The graduate division is undergoing a considerable reorganization. The graduate committee, under Dr. A. Miller, has recommended the extension of the Diploma course to three years—a recommendation regarded favourably by the Medical Faculty. Various adjustments, consistent with this extension, are under consideration and implementation. Seventeen graduate students were successful in the current Diploma examination; Dr. C. G. Chamberlain was awarded the Minister of Health's gold medal. Of past diplomates twenty-one were successful in the Certification examination of the Royal College, one was awarded the Fellowship of the Royal College by examination.

Congratulations are due to Mr. C. Greenland (awarded an Ontario Mental Health Foundation Research Associateship), to Dr. R. Pos (Canadian Mental Health Association Research award), to Dr. L. P. Solursh (R. Samuel McLaughlin Traveling Fellowship), and to Dr. T. R. Verny (Eli Lilly scholarship).

The psychiatric services of the teaching general hospitals have been involved in the teaching programme of senior internes, within the medical divisions. For this development thanks are due to Professor K. J. R. Wightman, head of the Department of Medicine.

The problem of continuing education in psychiatry for general practitioners has been tackled in an unusual way by Dr. D. J. McCulloch and his associates. In conjunction with the Postgraduate Division of the Faculty of Medicine and the Ontario Psychiatric Association, a group of psychiatrists from various provincial communities was brought together to consider ways and means by which general practitioners might be helped in the psychiatric aspects of their practice. After an eventful seminar

the psychiatrists returned to their communities there to engage with the local doctors in a mutual discussion of psychiatric problems. Some nineteen of such groups are in active operation.

Dr. A. L. Jones, with an active committee on postgraduate seminars, has developed instructional programmes in two ways. First, visiting lecturers have been invited to undertake two-day visits for an intensive teaching effort aimed primarily at the graduate students of the Department of Psychiatry. Secondly, seminars have been organized as postgraduate courses in conjunction with the Postgraduate Division of the Faculty of Medicine, to reach qualified psychiatrists throughout the Province. Dr. Lawrence Hinkle of Cornell University and Dr. Heinz Lehmann of McGill University, each served as visiting lecturers: symposia were held on Depression, on Child Psychiatry (in co-operation with Dr. E. J. Rosen and the committee on Child Psychiatry), and Family Therapy (with generous assistance from the Laidlaw Foundation). Both the visits and the seminar occasions were enthusiastically acclaimed.

The education, in psychiatry, of paramedical groups continues actively. Nurses, occupational therapists, social workers, clinical psychologists, probation officers, and the clergy have all been offered courses of instruction structured to meet their varying needs.

Over and above the formal occasions, involving distinguished psychiatrists as teachers or seminar leaders, many prominent psychiatrists from abroad have visited the Department to meet with staff members for the exchange of ideas. In their turn, many members of staff have visited other centres by invitation. The staff has also contributed widely in the field of mental health by public addresses, written articles, radio and television programmes, and the like.

Dr. C. B. Farrar, Professor Emeritus, has resigned as Editor of the *American Journal of Psychiatry* after thirty-four years of distinguished office. His services were acclaimed by the American Psychiatric Association at the annual meeting in New York. All his Canadian colleagues and students join in paying him tribute.

The Department is fortunate indeed in the appointment of Dr. C. A. Roberts as Associate Professor and Executive Director of the Clarke Institute. Dr. Roberts is President of the Canadian Psychiatric Association. Other notable appointments are those of Dr. W. J. Stauble of McGill University as Director of Education within the Department, and Dr. H. C. Haywood of Peabody College as Visiting Professor in Mental Retardation (through the generosity of the Ontario Association for Retarded Children). At a time of great change in the field of education it is sad to record the departure from the Department of Dr. D. J. Lewis (to McGill), Dr. T. J. Mallinson (to Simon Fraser University) and Dr. F. Rubenstein (to an appointment in the United States of America): our thanks and good wishes go with them in their new ventures. Dr. J. G. Dewan, after many fruitful years of colleagueship within the Department, has moved to the Ontario Mental Health Foundation where his services will still be available for the promulgation of psychiatry. Mr. F. Toombs has been seconded to the Department of Northern Affairs, Indian Affairs Branch, to develop an educational programme for field workers. His large experience in the area of social interaction will be well used in an exciting new venture.

The indebtedness of the Department to many friends, donors, and supporters cannot be sufficiently expressed. The provincial Department of Health and particularly the Minister, the Ontario Mental Health Foundation, the Clarke Institute, the McLaughlin Foundation, the Atkinson Charitable Foundation, the Laidlaw Foundation, the Queen Elizabeth II Canadian Research Fund, the Medical Alumni Association, the Ontario Association for Retarded Children, the Canadian Mental Health Association, the Medical Research Council, and the Postgraduate Division of the Faculty have all accorded strong support and financial resource to the work of the Department.

At a time of great change and innovation the Department of Psychiatry suffers the stresses and strains of maturation and development. As the numerous problems

inherent in a fluid situation are resolved, temporary discomfitures will disappear. The strengths of collegueship and the continued support of the Dean and the Medical Faculty are the warranty of high endeavour in the future.

RESEARCH

Reported by Professor J. W. Lovett Doust

The strengths of the new type of support for psychiatric research now being provided by the Ontario Mental Health Foundation are progressively being appreciated. Some 16 projects stemming from the Department of Psychiatry have received Foundation underwriting in the current year; this represents a major financial effort and is greatly welcomed.

Dr. H. C. Stancer has continued his supervision of the biochemical laboratories and the Clinical Investigation Unit of Toronto Psychiatric Hospital. With Dr. G. Brown, development has proceeded in the use of the autoanalyser for the *in vivo* measurement of glucose tolerance in patients with chronic schizophrenia and in matched healthy controls. In the laboratory, Mr. M. O'Flaherty and Mr. A. Zachwieja have assisted in modifying a methodology for the measurement of phospholipids and in applying it to the minute quantities present in the CSF of siblings with severe mental retardation. Also, and in collaboration with Dr. N. Stanacev, the sphingosine bases in normal human red and white blood cells have been determined. In the ward setting, a new psychiatric rating scale has been devised in collaboration with Dr. B. Quarrington. The scale has been tested and methods developed for computer application of data obtained longitudinally from a patient with recurrent mental illness.

Dr. Lovett Doust has continued his supervision of the psychophysiological laboratories at Toronto Psychiatric Hospital and the Clinical Investigation Unit at the Ontario Hospital, Toronto. In the laboratories, Mr. A. Luft has continued his developmental work on the design of a recording oximeter; Mr. I. Podnieks and Mr. L. Keltz have investigated respectively the psychological and the electrophysiological aspects of spontaneous oscillating activity in groups of psychiatric patients and in the normal siblings of retarded children; and Mr. J. Mourant and Miss S. Roberts are in the midst of a survey of patients with organic and functional psychotic states in an attempt to estimate the validity and reliability of the rheoencephalograph as an analogue of cerebral blood flow. In the ward, Dr. B. Cookson and Mr. L. Huszka have continued their metabolic studies of electrolyte and steroid balances in patients with relapsing affective disorders. Also at the Ontario Hospital, Dr. P. Christie has initiated studies of staff activity in an attempt to improve efficiency and a number of clinical research enquiries have been carried out.

Clinical research has been actively pursued throughout the facilities of the Department. Characteristic of the diversity of these are the interests of Dr. D. Lewis in Lilliputian hallucinosis and in current indications for electro-convulsive treatment at St. Michael's Hospital; the phenomenological studies of post-ECT confusional states and of certain affective disorders and an evaluation of the role of virus infection in contributing to psychiatric breakdown which represent research interests to Dr. A. Bonkalo at Toronto Psychiatric Hospital; the investigation into the implications of milieu therapy conducted by Dr. P. Melville of the same hospital, outcroppings of which are seen in the interests of Dr. T. Mallinson and Miss M. Clarke in the image of the nurse and how this may be influenced by street clothes and by uniform; the appraisal of the hallucinogenic drug, lysergic acid, in the treatment of alcoholics, and the relationship of agenesis of the corpus callosum to perception and learning which have engaged the attention of Dr. E. Baker and Dr. L. Solursh at Toronto Western Hospital; while, at Toronto Psychiatric Hospital outpatient department, Dr. D. Coates has tapped the populations of three mental hospitals for his study

of family interaction in schizophrenia and Mr. P. Chatterjee has compared the follow-up benefits in patients receiving interview therapy with those of patients who are denied this.

In the subspecialties of psychiatry in like fashion clinical research has been actively pursued. In the forensic field, for example, the publication of a handbook on pedophilia and exhibitionism placed a seal of accomplishment on the work of the Forensic Clinic and its Director, Dr. R. Turner. Subsequent to this, Dr. J. Mohr, Dr. K. Gray, and Mr. A. Gigeroff have combined to carry further the whole programme of studies of sexual offences in their clinical, social, and legal aspects. With Dr. R. Stokes, a group of dangerous offenders is being investigated. The concept of psychopathy was examined by Dr. K. Gray and Dr. H. Hutchinson, and these workers with Dr. M. Tuchtie also completed a study of the effects of alcohol on mental functioning.

In child psychiatry, similarly active research interests have been evident. At Thistletown Hospital, Dr. H. Alderton has followed up a group of severely disturbed boys as well as initiating drug screening trials and devising a rating scale to monitor sociopathic behaviour. Also at Thistletown, Drs. T. Ward and Hoddinott have continued their experimental treatment of childhood schizophrenia. At the mental retardation unit of Toronto Psychiatric Hospital, Dr. J. Fotheringham has sponsored several investigations. One, with Dr. J. Berg, was into the nail growth of mongols; another, with Mr. P. McDonnell, concerned approach-avoidance conflicts. The unit's major project this year was the initiation of an effort to measure change in the functioning of retarded children and their families resulting from twelve months residence in an Ontario Hospital School.

Studies of perceptual thresholds and their capacity to change under a variety of conditions have been undertaken by Dr. D. Cappon and his associates. These conditions have included those of sensory deprivation. Relative isolation or "underload" has similarly been the criterion for a research programme begun by C.M.H.A. award winner Dr. R. Pos and his associates, Drs. R. Laxer and R. Tasker.

The work of behavioural scientists has continued to provide stimulus, depth, and additional dimensions to psychiatric research. Dr. B. Quarrington's attempts to predict clinical outcome in cases of stuttering and to examine stuttering on the basis of an approach-avoidance conflict model may be mentioned as one example. His ongoing study of feeling-state oscillation is another. None of these endeavours is without clinical relevance, however, since each bears upon parallel collaborative work in out-patient and in-patient departments respectively. Similar comments apply to the several investigations of Dr. A. Slemon of the Toronto Psychiatric Hospital's Children's Department. Here, operant conditioning experiments, construction of behavioural rating scales, and an attempt to adapt the Sentence Completion Test to children's use were all carried out within the framework of the needs and interests of a busy children's clinic.

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RADIOLOGY

Under the direction of Professor M. R. Hall

There has been no essential change in the undergraduate or post-graduate teaching in the department during the past year. The postgraduate course leading to the Diploma in Medical Radiology continues to attract postgraduate students, and four candidates have obtained their D.M.R. diplomas this year.

During the year 1964-1965, in addition to routine duties, members of the staff gave lectures and papers to other than local groups, as follows: C. L. ASH and R. B. HOLMES, panelists on "Training of Radiologists" at the annual meeting of the Canadian Association of Radiologists, Toronto, February, 1965. R. B. HOLMES, on "Calcification of the Heart" to the Toronto Radiological Society, October 19, 1964; panelist on "Neuromuscular diseases of the Esophagus" at the annual meeting of the Royal College of Physicians and Surgeons, Toronto, January, 1965; on "The Role of Incompetent Communicating Veins in Stasis Disease of the Lower Leg" to the Association of University Radiologists, Seattle, May 14, 1965; and with P. C. Thorfinnson, on the "Cine Veriography of the Lower Limb" at the annual meeting of the Royal College of Physicians and Surgeons, Toronto, January, 1965.

E. L. LANSDOWN, panelist on "Hypertension" at the Annual Meeting of the Royal College of Physicians and Surgeons, Toronto, January, 1965; on "The Significance of Multiple Ostia and Anastomotic Channels in the Assessment of the Coronary Arteries" to the staff of the Victoria General Hospital and members of the Canadian Forces Hospital, Halifax, August, 1964.

M. V. PETERS, on "Hodgkin's Disease" to the American Roentgen Ray Society, refresher course, Minneapolis, Minnesota, September, 1964, and at the Annual Meeting of the Radiological Society of North America, refresher course, Chicago, Illinois, November 30 to December 3, 1964; on "Long-Term Control of Hodgkin's Disease" at Yale University, New Haven, Connecticut, October, 1964; on "Present-Day Perspectives of Lymphoma" to the Department of Medicine, Buffalo General Hospital and Roswell Park Cancer Institute, Buffalo, New York, October, 1964; on "Radiation Therapy" at the Regional Meeting of the American College of Physicians, Williamsville, New York, October, 1964.

B. J. REILLY, on "Infantile Ulcerative Colitis" at the Annual Meeting of the Canadian Association of Radiologists, Toronto, February, 1965; on "Spontaneously

Regressing Unexplained Skeletal Lesions in the Newborn" at the Annual Meeting of the Society for Pediatric Radiology, Minneapolis, September 1964. W. D. RIDER, on "Panel Management of Malignant Disease" at the American College of Obstetrics and Gynaecology, Toronto, October, 1964; on "Testicular Tumors—Past, Present, and Future Thoughts" at the Ontario Cancer Treatment and Research Foundation, Thunder Bay Clinic, Port Arthur, Ontario, October, 1964. D. E. SANDERS, on "Angiographic Diagnosis of Hydatidiform Mole" at the Annual Meeting of the Canadian Association of Radiologists, Toronto, February, 1965; on "Placentography" at the postgraduate refresher course in Obstetric Radiology at Queen's University, Kingston, Ontario, November 6, 1964. GEORGE WORTZMAN, on "Rotatory Atlanto-Axial Subluxation" at the Annual Meeting of the Canadian Association of Radiologists, Toronto, February, 1965.

RESEARCH

Dr. G. S. Bird, in co-operation with Dr. J. E. Mullens, is carrying out a review of results of operations on ninety-three cases of repair of the esophageal hiatus. This is under a grant from the Wellesley Hospital Research Foundation. Dr. J. H. Gardiner is continuing his studies on the temporo-mandibular joints. Drs. R. B. Holmes, R. F. Colapinto, and E. L. Lansdown are continuing the research on radiologic aspects of coronary calcification. Dr. Holmes, in conjunction with Dr. P. C. Thorfinnson, has also extended his study of varicose veins. Dr. H. E. Meema is pursuing his study of cortical bone measurements in metabolic bone disease. Dr. C. A. F. Moes is continuing the investigation of the total anomalous pulmonary venous drainage into the azygos vein. He is also studying the appearance of pulmonary vascularity in congenital heart disease under one month of age.

Reported by Dr. C. L. Ash

The following research projects supported by grants from the Defence Research Board and the Ontario Cancer Treatment and Research Foundation were conducted by members of the Department of Radiotherapy:

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|---|---------------------|
| 1. Study of acute radiation syndrome in man | \$ 5,000 (D.R.B.) |
| | 15,600 (O.C.T.R.F.) |
| 2. Development and clinical trials of an improved body scanner | 9,160 (O.C.T.R.F.) |
| 3. Immunotherapy in the management of choriocarcinoma | 12,600 (O.C.T.R.F.) |
| 4. Immunization of patients with a diazotized extract of their own tumors | 10,800 (O.C.T.R.F.) |
| 5. A Sr^{90} electron beam therapy unit | 10,000 (O.C.T.R.F.) |

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SURGERY

Under the direction of Professor F. G. Kergin

We are facing the most fundamental change in medical education since medical students were first taught in hospitals. There has always been a supply of the medically indigent to populate our teaching wards, to receive the advantage of excellent medical care and to co-operate, usually quite willingly, with the teaching programme for undergraduates and the graduate training programme.

Under the legislation now before the Ontario House this will be changed radically. All the truly indigent citizens of the province, and those with a very low taxable income, will be insured for medical care and their premiums paid, in whole or in part, by the Government. This may produce the anomalous situation that certain hard-working, self-employed, and self-supporting people whose incomes are low, but not low enough to qualify them for the Government subsidy, may find that they cannot afford to insure themselves and their families. If they become ill they may become medically indigent, while the truly indigent, supported by taxpayers' money, have all the privileges of private care.

If it is agreed, as it must be, that the only way to train doctors is by giving medical students an opportunity to observe and examine human patients, and that the only way to produce surgeons is by a long course of training comprising progressive care of patients and operative experience, culminating in independent responsibility, then this new situation must be adapted in some way to our teaching and training obligations.

There is some comfort in the thought that even though they will no longer be accepting free medical care, our citizens in the low income group are still the same kind of people who have always co-operated so well in our teaching and training programmes. There is some justification in suggesting that when a patient whose medical insurance is subsidized, in whole or in part, by taxpayers' money requires medical care in a teaching hospital, he should be admitted to a teaching ward to receive the advantages of the excellent care available on such a unit. Unfortunately, that is not the intention of our Government.

This situation represents a challenge which we must meet in a positive way. We must, on our teaching units, provide amenities and service which make them acceptable, and exemplary medical care which will attract patients to them willingly with all varieties of illness. It will not be good enough if they are populated by acutely ill patients who are there unwillingly, only because no other bed is available.

Two highly respected members of the Department are retiring at the end of this year to continue in private consulting practice. Dr. S. D. Gordon was the first plastic surgeon appointed to the staff of the Toronto General Hospital and developed the strong service of which he has been head. Dr. W. S. Keith was the first neurosurgeon appointed to the staff of the Hospital for Sick Children, and also the Toronto Western Hospital. He has made many contributions, particularly in the field of paediatric neurosurgery. The department is grateful to Dr. Gordon and to Dr.

Keith for their many years of service, during which they have given so freely of their time in teaching our undergraduates and training our graduates in their special fields.

Dr. Peter Blundell, who has had a very extensive training in both clinical and experimental cardiovascular and thoracic surgery, has served the Department for a year as a clinical teacher and has continued his research projects while a member of the Division of Cardiovascular Surgery of the Toronto General Hospital. He has accepted an appointment to the staff of the Montreal General Hospital and carries with him the good wishes of the department.

During the year many distinguished surgeons have visited us. Dr. Bertram Selverstone spent a week as Visiting Professor of Neurosurgery and conducted stimulating teaching rounds at all the teaching hospitals. During his visit he gave the annual Balfour Lecture on the subject of "Physics and Physiology in Neurosurgery: the Diagnostic Use of Isotopic Tracers." It was a most interesting review of his pioneer work in the diagnosis of brain lesions by the use of radioactive isotopes.

During the month of June Mr. H. Osmond Clarke, the Senior Orthopaedic Surgeon of the London Hospital, spent a week visiting the orthopaedic units of all the major hospitals which are linked with our training programme in orthopaedic surgery. He was favourably impressed by the excellent programmes of papers provided in each hospital, and added much to the discussions from his own great experience.

During the year Dr. R. A. Mustard accepted a part-time appointment as Director of Graduate Training in the Department, with the rank of Associate Professor. This will relieve the head of the Department of the interesting but exceedingly time-consuming administration of our increasingly large training programme which, in 1965-66, will include 93 young surgeons in clinical appointments and 15 in research fellowships. Dr. Mustard brings to this very responsible position mature judgment and outstanding administrative ability.

RESEARCH

Cardiovascular Surgery

The Cardiovascular Surgical Research Laboratories at the Banting Institute have again had a productive year. Dr. Bigelow has directed Dr. J. A. Armour in experimental work designed to produce a biological pacemaker for the heart and in a continuation of his studies of the protective action of ether and alcohol on the heart in deep hypothermia. With other members of the Division of Cardiovascular Surgery of the Toronto General Hospital and members of the Department of Medicine, he is continuing a careful follow-up study of various groups of patients who have been treated surgically for heart disease.

Dr. P. E. Blundell has been assisted by Dr. P. Bedard in the experimental transplantation of aortic valve heterografts into the sub-coronary position in calves and in the creation of an acquired subaortic muscular stenosis in the dog. He has studied a series of patients who had received autogenous saphenous femoro-popliteal by-pass grafts at the Toronto General Hospital.

Dr. R. O. Heimbecker has been assisted by Dr. K. T. Song and Mr. R. Zahoruk, of the fourth medical year, in a very active research programme. He has continued his work on intracardiac replacement of the mitral and tricuspid valves by homograft valves, and has extended it to include heterografts with excellent short-term success. The team is examining the effect of low molecular weight dextran on intravascular agglutination of red cells produced experimentally in the hamster and are attempting to achieve oxygenation of blood by an electrical method.

Dr. J. A. Key, assisted by the resident staff has completed a study of a large series of patients who have been treated at the Toronto General Hospital for acute injuries to major blood vessels.

Dr. H. F. Robertson has completed a long series of observations on the effects

of hyperbaric oxygen on dogs subjected to coronary artery ligation under various experimental conditions and has reported his results.

Dr. A. S. Trimble, assisted by Dr. P. Bedard, has brought the technique of unilateral lung reimplantation to a high degree of success and, in addition to studies of the efficiency of the reimplanted lung, is studying the effect of this procedure on lung surfactant and the effects of vagal interruption. He is initiating experiments on the reimplantation of the canine heart under deep hypothermia and cardiac by-pass.

At the Hospital for Sick Children, Dr. W. T. Mustard and Dr. G. A. Trusler have continued their active research programmes. The work on a membrane oxygenator, reported last year, has progressed and Dr. Mustard is exploring, with a manufacturer of plastic materials, the possibility of producing a more effective membrane. His experiments involving the implantation of pericardium into the atrial wall of puppies indicate that the pericardium can grow, supporting previous observations of a similar type on piglets.

Dr. Trusler has continued his collaboration with Dr. M. N. Srouji in a study of experimental acute cardiac failure, including observations on the effect of THAM on this type of experimental acidosis.

At St. Michael's Hospital, Dr. W. Sapirstein's interest, during the past year, has been in investigating lung compliance after various types of cardiac by-pass.

At the Toronto Western Hospital Drs. D. R. Wilson and R. J. Baird have been assisted by Dr. R. Sivasankar in several investigations. Dr. Wilson has compared the improvement in blood flow to an ischemic limb using low molecular weight dextran with that produced by other methods of treatment. He is collaborating with the Department of Medicine and the Division of Urology of that hospital in a continuing investigation of hypertension.

Dr. R. J. Baird has continued his study of factors influencing vascular resistance in the limbs of experimental animals. He has also examined changes in pulmonary vascular resistance following experimental autotransplantation and homotransplantation of the lung.

General Surgery

Able assisted by Dr. Stephen Strasberg, Dr. N. C. Delarue has directed a broad-based clinical research programme in the field of lung cancer. An analysis of the investigation and result of treatment of some 1,200 patients with lung cancer in the records of the Toronto General Hospital has been made. By cytological examination of sputum samples collected under controlled conditions, a very extensive screening of individuals in the lung cancer high risk group has been carried out in collaboration with the Department of Pathology. The people screened were drawn from the Outpatient Clinic and also the employees of a large commercial organization. A study has been made of patients treated surgically for bullous emphysema and an extension of these clinical investigations is planned.

Dr. F. G. Kergin has collaborated with Dr. C. R. Woolf, of the Department of Medicine, in a study of the effects of unilateral carotid body excision in patients with severe bronchial asthma.

Dr. Bernard Langer, assisted by Dr. A. A. Kambouris, has been carrying out transplants of liver homografts in the experimental animal and in association with Dr. J. W. Steiner, of the Department of Pathology, has studied the rejection phenomenon and also the effects of ischemia on the liver of the intact dog. They have also studied blood volume variations in patients with wasting diseases and in association with a cancer chemotherapy group, in which the Department of Medicine and the Department of Obstetrics and Gynaecology were also represented, a clinical study is being made of the response of various tumours to chemotherapeutic agents.

Dr. N. T. McPhedran has directed Dr. R. J. Ginsberg in a continuing search for a gastric secretagogue originating in the pancreas. In an attempt to increase the

production of this substance they are producing cirrhosis of the liver in dogs. They have also used a gastro-intestinal pacemaker in patients who had been subjected to cholecystectomy, without appreciable benefit.

Dr. F. G. Pearson has continued his experimental work on tracheal replacement, using heavy Marlex mesh and by various modifications in techniques is achieving increasing success. He has had an opportunity to apply these techniques to several human patients, with success. He has given up his efforts to replace the oesophagus experimentally by free colon transplants until a stapling apparatus capable of anastomosing very small vessels becomes available. With Dr. H. B. Fairley, of the Department of Anaesthesia, he is making a clinical study of respiratory function in acute chest injuries.

Dr. J. E. Mullens is studying the colonic mucosa of patients with ulcerative colitis in a search for *E. coli* antigens.

At the Hospital for Sick Children, Dr. C. A. Stephens is conducting a follow-up study of children treated for idiopathic ulcerative colitis during the past 15 years.

In the Research Institute of the Hospital for Sick Children, Dr. Walter Zingg is studying the effects of experimental brain damage and is also investigating various rewarming techniques in experimental general hypothermia. He is collaborating with Dr. W. T. Mustard in his development of a membrane oxygenator.

At the New Mount Sinai Hospital, Dr. D. R. Bohnen is making a clinical study of the use of plastic materials in the repair of difficult hernias.

Neurosurgery

At the Toronto General Hospital Dr. T. P. Morley has supervised Dr. C. H. Tator's continuing research on the uptake of radioactive isotopes by brain tumours. Dr. W. M. Lougheed has supervised Dr. Ghahreman Khodadad in a very successful experimental study of the repair and by-pass of defects in very small arteries by microsuturing techniques. A new type of intracranial clip has been developed for clinical use. Dr. R. R. Tasker has been assisted by Dr. Pierre Forcier in a number of experimental studies. The mechanism of Tremorine-induced tremor in the rat has been studied by making recordings from a single unit in the ventral root. The pathology of cold probe lesions of the brain has been investigated. A method is being developed to assess Parkinson's Disease quantitatively and to measure the results of treatment. With Dr. C. R. Woolf, of the Department of Medicine, clinical investigation of the effects of thalamotomy on respiratory function is being carried out. With Dr. R. Pos, of the Psychiatric services, a research study of problems of sensory deprivation has been started.

At the Hospital for Sick Children, Dr. E. B. Hendrick is carrying out a clinical study of traumatic epilepsy in children, and Dr. H. J. Hoffman is studying the effects of steroid therapy on experimental cerebral edema.

At the Toronto Western Hospital, Dr. J. F. R. Fleming is studying the effects of low-molecular weight dextran on experimental brain infarction produced by interruption of the middle cerebral artery.

Orthopaedic Surgery

Very active programmes of experimental and clinical research in orthopaedic surgery are being pursued in a number of the teaching hospitals. At the Toronto General Hospital Dr. F. P. Dewar and Dr. D. C. Evans have observed and described examples of a hitherto unrecognized type of occult fracture subluxation of the mid-tarsal joint. Dr. D. L. MacIntosh has continued his clinical studies of the results of arthroplasty of the knee in various types of arthritis. Dr. W. R. Harris has been assisted by Dr. H. Schutz in his continuing study of the effects of transplanting epiphyseal plates. They have demonstrated that growth can be obtained in the cut end of the humerus, above the elbow, by transplanting a distal ulnar epiphysis. Exploratory studies in the use of magnetism to suspend artificial limbs are promising.

Dr. Ian Macnab has directed Dr. R. W. Galway in an investigation of the effect of injecting chymopapain into the nucleus pulposus of experimental animals. This substance will regularly destroy the nucleus, and toxicity studies demonstrated that chymopapain is well tolerated in the epidural space but exceedingly toxic in the subarachnoid space.

At the Hospital for Sick Children Dr. R. B. Salter and his associates have again had a very productive year of laboratory and clinical investigation. Dr. Salter, with Dr. Spyros Dallas, has continued his experimental investigation of avascular necrosis of the femoral head. This has been produced in young pigs by forced abduction after previous shortening of the adductor muscles, but is prevented if these muscles are sectioned. Avascular necrosis in the same animal has also been produced by maintaining an increased intra-capsular pressure. Both these experimental observations have been applied clinically. With Dr. J. D. Graham, Dr. Salter has investigated acute synovitis in the knee joint of the rabbit caused by injecting Irish Moss; they have also studied the course of traumatic arthritis in the same animal after damaging the knee joint in various ways. They have studied the factors involved in spontaneous reversal of surgically produced torsional deformities of the femur in growing chickens. Dr. Salter has also directed the following clinical studies: with Dr. J. Kostuik, the incidence of avascular necrosis of the femoral head following treatment of congenital dislocation of the hip; with Dr. Jean Aubin, osteochondritis dissecans; and with Dr. J. D. Graham, radiographic measurement of acetabular direction and femoral ante-version. Dr. J. E. Hall continues as chairman of the Prosthetic Research Committee at the Crippled Children's Centre and, at the Hospital for Sick Children, has been assisted by Dr. I. Grossfield in a clinical study of the pathophysiology of scoliosis using radioactive xenon to study the distribution of functioning lung and a special instrument to measure chest wall deformity. A clinical follow-up of approximately 300 patients with scoliosis is being done. Dr. D. A. Gibson is conducting a review of the late results of subtrochanteric osteotomy for slipped femoral epiphysis. Dr. W. P. Bobechko, while at the University of Gothenburg, Sweden, as a McLaughlin Travelling Fellow, carried out experimental work which demonstrated that when the nucleus pulposus is displaced and revascularized it elicits a local auto-immune reaction. He plans to extend these studies.

At the Toronto Western Hospital Dr. A. M. Wiley has completed an experimental study of the effect of delayed internal fixation on the healing of fractures. At St. Joseph's Hospital Dr. Glen McDonald continues a programme of laboratory and clinical study of factors contributing to low back pain. At the Toronto East General and Orthopaedic Hospital, Dr. E. H. Simmons has extended his clinical and laboratory studies of caisson disease in association with Dr. J. A. Gamarra. Experimentally, hypothermia has proved very effective in treating acute decompression sickness. They have also demonstrated severe blood sludging in animals subjected to acute decompression sickness. A clinical study of individuals who have worked under compressed air is in progress and is demonstrating a high incidence of late effects.

Plastic Surgery

At the Hospital for Sick Children, Dr. W. K. Lindsay, assisted by Dr. L. G. Douglas and in collaboration with Dr. S. Jackson of the Division of Biochemistry of that hospital, has extended his detailed studies of tendon healing in the chicken. By his previously developed technique of using tritiated proline as an indicator of collagen formation he has studied the effect of various drugs and also reduced tension on the healing process. Dr. H. G. Thomson has continued his work on pigment tattooing of pigs, and is also studying flexor tendon repair in monkeys.

Urology

At the Hospital for Sick Children Dr. R. D. Jeffs has directed Dr. G. Seagram

in a continuation of attempts to produce chronic pyelonephritis in the experimental animal in the absence of ureteral obstruction or reflux. To date this has not been successful.

In the laboratories of the Banting Institute, Dr. W. K. Kerr has directed Dr. Stanley Woo and Mr. S. Menczyk in a study which indicates that the smoking of cigarettes causes an increase in bladder carcinogens in the urine of human beings.

Dr. C. J. Robson has been assisted by Dr. Samuel Hunter in an experimental investigation of electrical stimulation of the paralysed bladder to produce contraction.

At the Toronto Western Hospital Dr. P. O. Crassweller has continued his studies of the factors affecting urinary stone formation with special reference to variations in urinary pH, and ammonium excretion. As a clinical study, patients with transitional cell carcinoma of the bladder have been given local applications of nitrogen mustard to supplement surgical treatment with some indication of benefit. The fibrinolysin levels in patients with benign and malignant prostatic disease are being studied both pre-and post-operatively. Also at the Toronto Western Hospital, Dr. I. A. D. Todd carried out an experimental comparison of gross and microscopic changes in free autografts and homografts of major blood vessels. He developed the technique of renal homografts in dogs, and studied the response to various drugs.

At St. Michael's Hospital Dr. V. Colapinto is carrying out a clinical study of the effect of topical and systemic chemotherapy on malignant tumours of the bladder and prostate.

At the Princess Margaret Hospital, in co-operation with the Department of Radiotherapy, Dr. A. Keresteci is making a clinical study of the possible enhancement of the effect of radiotherapy on bladder tumours in patients who breathe oxygen in a high concentration.

At the Toronto Hospital, Weston, Dr. G. Gale is conducting a follow-up review of the very large number of patients who have been treated for genito-urinary tuberculosis by chemotherapy.

Dr. P. Klotz, at the New Mount Sinai Hospital, is making a clinical study of the effects of intravenous administration of sulfonamides on urinary tract infection after prostatectomy.

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THERAPEUTICS

Under the direction of Professor R. W. Gunton

Teaching in the third year has continued to include a weekly didactic lecture, and a weekly case assignment written up by each member of the class and discussed in the style of a theatre clinic. Members of the staff of the Department of Medicine have given valuable assistance in this program. The desirability of "coverage" of subject material has received some thought. The policy in this Department has been to make certain that the treatment of all the common and important medical illnesses of adults is presented to the students either in lectures or as examples in the case assignments. The wisdom of this traditional practice has been brought into question not only by informal discussion with the dean of another medical school who declared that "coverage is forbidden at our place as a matter of deliberate policy," but also by the repeated alarms sounded in essays on medical education and in our own study groups that the curriculum content cannot encompass all the important factual material—the student must be trained to "think." Although therapeutics is entitled to some attribution of logic and reason, a significant part of its content and practice remains empiric—which does not invalidate its worth—and a little remains in its "art." It seems appropriate to continue the present policies of "coverage," and didactic presentation for those parts of the subject still not amenable to scientific systematization.

In the fourth year the demonstrations of therapeutic and diagnostic techniques are well received by students but the Clinical-Pharmacological Conferences fail to inspire enthusiasm in either students or staff. Theoretically this joint teaching effort by pharmacologist and clinician, patient-based and designed for student participation, should be a useful teaching and learning exercise. It does indeed boast some of the ingredients of that overworked concept of ideal medical teaching—integration. In the case of these conferences it has not fulfilled its promise and new approaches must be sought.

Dr. John Spears has been appointed the University of Toronto representative in the Adverse Drug Reaction Reporting Programme sponsored by the Food and Drug Directorate of the Department of National Health and Welfare. His duties are to report adverse reactions to drugs occurring in patients in the Toronto General and Women's College Hospitals. The object is to increase local knowledge of these reactions in this university medical centre, to contribute to the sum of reports received from other university hospitals in Canada by the Directorate, and ultimately through the Directorate to channel data on this subject from Canada to other countries and to the World Health Organisation.

The following papers were presented: "Cardiovascular Investigation and Treatment," Lincoln County Academy of Medicine; "Cardiogenic Shock," Medical Sciences Sessions, Queen's University; "Treatment of Ischaemic Heart Disease," Refresher Day in Cardiology, University of Western Ontario; "Psychotropic Drugs: The Internist's Point of View," Symposium, Ontario Medical Association, Section of Psychiatry.

RESEARCH

Dr. John Spears has continued the clinical evaluation of guanoxan (Compound 1003, Pfizer) a catecholamine depleting agent, in the treatment of hypertension.

Dr. Thomas Godwin has conducted two projects: (1) A new non-thiazide diuretic agent, furosemide (Hoechst) has been compared in natriuretic potency with hydrochlorothiazide and mercaptomerin in patients with oedema. (2) A new beta-adrenergic blocking agent, propranolol (Inderal I.C.I. and Ayerst) has been compared with a placebo in the treatment of angina pectoris in a double-blind trial in out-patients. In a separate trial these same patients with angina have received penta-

erythritol tetranitrate, prenylamine, and placebo in randomly assigned order with double-blind control.

Dr. Mary Robertson, a former Teaching Fellow in the department, has returned as a Research Fellow with the support of a grant from the newly formed Canadian Foundation for the Advancement of Therapeutics. Dr. Robertson has commenced a study on the prognosis and treatment of asymptomatic bacteriuria in co-operation with Dr. F. M. Hill of the Department of Medicine, at the Women's College Hospital.

PUBLICATIONS

BEANLANDS, D. S. and GUNTON, R. W. "Angiotensin II in the Treatment of Shock following Myocardial Infarction" (*American Journal of Cardiology*, vol. 14, no. 3, 1964, pp. 370-3).

THE DIRECTOR OF THE BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Mr. C. R. Cowan has extended the investigation of blood flow in the extra-corporeal chamber to include the study of the effects of the electric current and differing polarity in inducing thrombosis in small animals. At the request of the surgical team of St. Michael's Hospital he has developed a portable micro-infusion apparatus which can be worn by ambulatory cancer patients. Donations of both skills and materials by members of Ingraham Canadian Clock Co. Limited and Plasti-Pak Containers Limited have speeded development, enabling the first treatment to be undertaken at the time of writing. It is anticipated that similar devices will be in use in this Hospital in the near future.

Dr. S. Mookerjee has continued to investigate the possible relationship between a blood "lipotropic factor" and fat metabolism in livers of choline-deficient animals. Starch-gel electrophoresis of serum proteins shows a reduction of the slow α -globulin protein in choline-deficient rats. During recovery from choline deficiency this protein fraction returns to a normal level. An ammonium sulphate fraction of rat serum (which contains the slow α -globulin) causes some restoration of triglyceride release from choline-deficient livers in the isolated perfusion system.

In a continuation of studies on the metabolism of complex inositol-containing lipids in brain tissue, Professor W. Thompson has isolated and partially purified an enzyme catalysing the rapid hydrolysis of phosphatidyl inositol. The characterization of the reaction products and the study of the properties of the enzyme system are in progress.

Dr. Nina Morley has measured insulin levels in the blood of rats and dogs by a radio immunological method. The separate and combined effects of tolbutamide and ethyl alcohol upon the levels of glucose and insulin in the blood have been investigated in both rats and dogs. The decline in blood insulin during severe food deprivation has been studied in rats.

Dr. B. Rosenfeld has continued his studies of the structure of the hepatic "fat globules" and has explored the hitherto unknown nature of their phospholipid constituents. The latter differ both qualitatively and quantitatively from those shown by the particulate matter of the liver cell and respond strikingly to the intake of a single choline-deficient meal by the rat. This new and early effect of choline deficiency on the structural characteristics of the hepatic fat globules may have some bearing on the mechanism of their subsequent accumulation in the liver cell.

In the Sub-Department of Synthetic Chemistry, the synthesis of phospholipids and phosphonolipids of biological interest was continued by Professor E. Baer and his colleagues, Professor D. Buchnea (propylene glycol analogues of cephalins and lecithins), Dr. K. V. J. Rao (α -amino acid esters of L- α -phosphatidyl- α -glycerols), Dr. B. C. Pal (phosphatidyl- β -methyl-cholines), Dr. N. Z. Stanacev, Dr. G. R.

Sarma, and Dr. Ranga de Souza (phosphonic acid analogues of lecithins and cephalins). The members of the staff were ably assisted by Mr. H. Flehmig.

In Professor D. W. Clarke's section, a study of the effects of DBI, an oral hypoglycemic agent, on rat diaphragm has been completed by Mr. C. C. Liew for his M.A. degree. This compound apparently increases the rate of ATP turnover in diaphragms from normal rats, whereas the rate is decreased in diaphragms from alloxan-diabetic rats.

Studies on the effects of alcohol upon ATP-ases obtained from different parts of rat brain have been continued.

An investigation of the effect of serum from guinea pigs with experimental allergic encephalomyelitis upon the release of free fatty acids of rat brain has been completed by Dr. Linda Geiger in partial fulfillment of the requirements for the B.Sc. (Medicine) degree. The work is being continued with an investigation of the effects of sera from humans suffering from various neurological conditions to see if there might be a factor in their serum that would adversely affect brain tissue.

With the assistance of Miss M. M. Shaw and Mr. J. Skublics, Professor W. R. Franks has continued the work in cancer research. The modification of hosts, bearing spontaneous tumours recurrent after surgical failure, into immune graft-hybrids has, during the year, yielded three cures out of a total of 31 animals, one out of 19 with carcinogen tumours and two out of 12 with mammary tumours. Cures resulted only when grafts included thymic cells as well as cells from bone marrow, lymphoid tissue, and mucosa of the small intestine. Brother-sister relationships of graft donors to hosts appeared most promising; host-tolerant parent-donors proved disappointing. This work has been carried out in part with the assistance of anonymous contributions.

The accident prevention work has been extended. Methods are being sought by post mortem biochemical examination to estimate the role of human failure in an accident cause. An adrenergic response can be differentiated in these examinations from hypoxia (asphyxia) by the relative lactate concentrations in liver compared with kidney. Ante mortem fire can be differentiated from post mortem fire by the inhibition of glycolytic enzyme activity. With the assistance of Mr. G. Meek, a computer programme is under investigation to enable a final probability to be assessed from the combined results of these tests. A study of ways to improve the performance of precise manual tasks under conditions of vibration is being continued.

Dr. W. J. Linghorne is continuing his work on the physiology of bone with particular reference to the mechanism of osteogenesis, especially with respect to bone repair. This work provided the stimulus for a study of etiology of headache and other head pain of extra cranial origin in those cases where no physical sign or radiological abnormality can be found.

Professor J. Logothetopoulos has investigated the regeneration of the cells of the islets by autoradiography and has continued the study of the electron microscopical changes of the islet cells in experimental diabetes.

Professor C. C. Lucas and Dr. Jessie Ridout have studied liver changes in rats fed protein-free diets. Addition of choline chloride or of methionine, singly or together, had little effect on food consumption or weight loss. Supplementary methionine increased the liver lipids and choline only partially prevented this. Other rats have been fed for prolonged periods (over 200 days) with rations containing different kinds of natural proteins at the 6 per cent dietary level. Some rats drank water, others drank 15 per cent v/v ethyl alcohol and the remainder were tube-fed 30 per cent v/v alcohol four days per week in amounts providing the same total average weekly intake. The latter rats were usually intoxicated, the former never. The ability of the different proteins to protect against intoxication and liver damage decreased in the order: (1) dried whole egg powder, (2) wheat, (3) rice, (4) mixed grains, (5) skim milk powder, (6) maize, (7) crude peanut meal, and (8) potato flour.

Throughout the past year Professor G. A. Wrenshall's section has been the working centre for the committee organizing and publishing the scientific programmes of the International Diabetes Federation's Fifth Congress. In this work Professor B. S. Leibel served as Joint Chairman and Mrs. A. M. Jamieson as Committee Secretary. Concurrently, collaborative and student research projects have progressed, covering the following topics: a tracer study with Professor G. Hetenyi, Jr. of how the normal resting dog adapts to changes in the rate of infusion of glucose into the blood stream; tracer experiments with Professor A. M. Rappaport and Dr. M. Vranic on the rapidity with which changes occur in dogs after pancreatectomy, in the rates of glucose production, accumulation, and utilization; effects of various nutritional states on the tracer-determined rate of gluconeogenesis in normal resting dogs (with Mr. J. S. Cowan); and studies on glucose transfer in a specific muscular region of the dog (with Mr. S. G. Ilk).

In Dr. J. Salter's section an electrophoretic technique for quantitatively estimating sub-micro amounts of glucagon and insulin has been devised and a simple but apparently extremely efficient method for extracting the two hormones from pancreas and blood has also been developed. Mr. K. Itiaba has completed studies which show that urea cannot, as many contend, be synthesized directly from glutamine. The factors responsible for the erroneous contention have also been elucidated.

Mr. Itiaba has also completed many phases of an investigation of albumen metabolism in animals with malignant tumours.

Two major research problems have been undertaken in Professor C. C. Yip's laboratory: the biosynthesis of the thyroid hormone, thyroxine, and the biosynthesis of insulin. Two enzymic steps are involved in the biosynthesis of thyroxine and the enzyme catalyzing the iodination of tyrosine to diiodotyrosine has been partially purified and its properties are being studied. Experiments are being done to investigate the involvement of 4-hydroxyl-3, 5-diiodophenylpyruvic acid, the oxidative deaminated analogue of diiodotyrosine, in the *in vivo* and *in vitro* biosynthesis of thyroxine from diiodotyrosine. In the biosynthesis of insulin, the investigation on the native state of insulin in the pancreas has been of main interest. This portion of the research has been carried out in collaboration with Dr. B. J. Lin who performed the immunoassay of insulin. Preliminary results obtained using isolated mouse islets have indicated that considerable amounts of insulin are associated with large protein molecules in sucrose gradient centrifugation.

Professor B. S. Leibel, in association with the Department, continues to provide valuable information on the clinical aspects of diabetes and related diseases.

Mr. K. R. Bowler has been of invaluable assistance in solving the complex financial and administrative problems of the Department and of the Charles H. Best Institute.

The Fifth Congress of the International Diabetes Federation was held in Toronto in July, 1964. Members of the Department and the staff of the Charles H. Best Institute contributed in many ways to its success. It is a pleasure to acknowledge their assistance.

C. H. BEST

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